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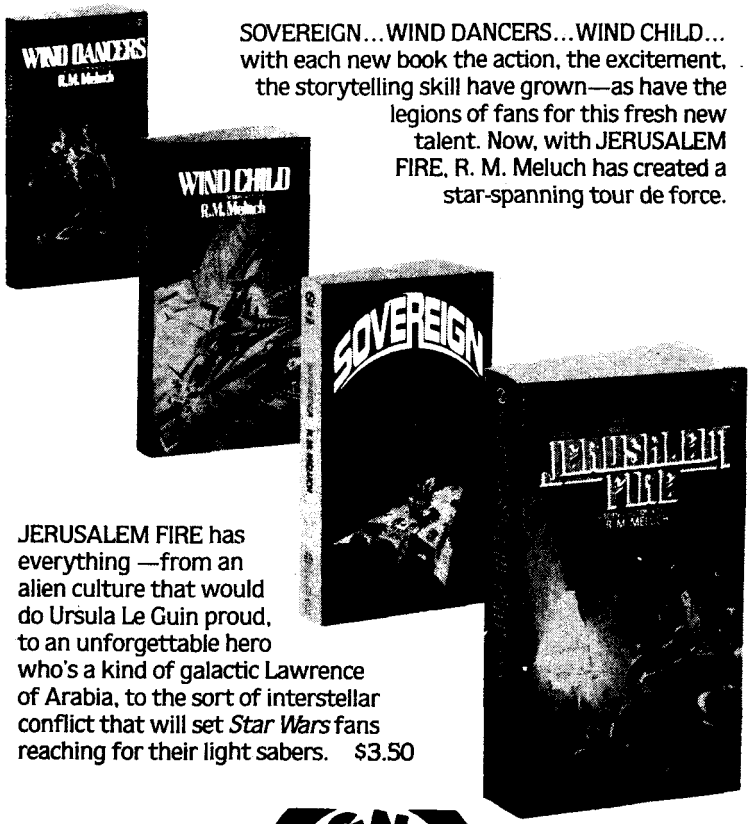

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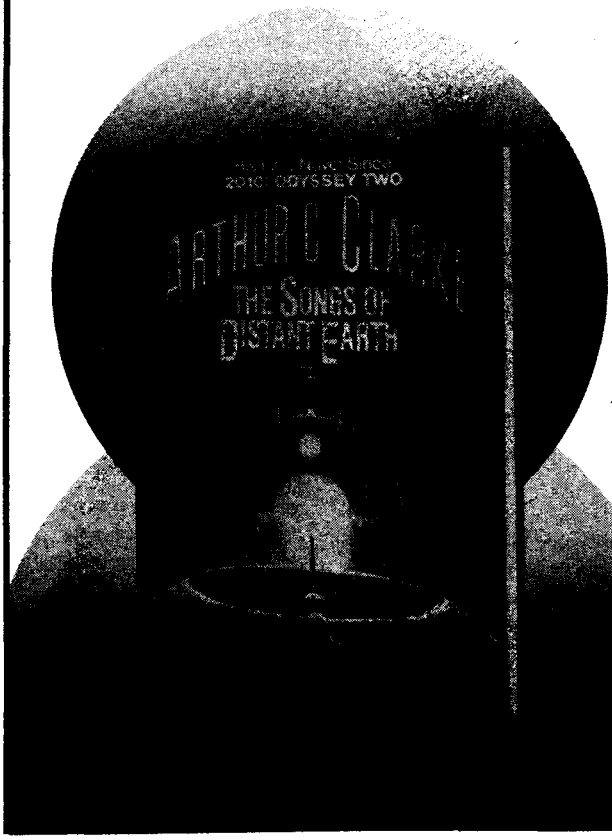

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Editorial

WHO'S RESPONSIBLE?

Stanley Schmidt

On the desk in front of me is a letter from an organization called Action on Smoking and Health. "Dear Friend of ASH," it begins. "Now that we have found the two most effective strategies in the war on smoking, we need your support more than ever to continue the fight. . . ." It goes on for two pages and concludes, in a P.S., "If you have recently renewed your support of ASH, we thank you!"

I hate to disappoint these earnest people, but I cannot "renew" my support because I have never given them either money or services in the past. Nor am I likely to now or in the foreseeable future—but not, I hasten to add, because I don't have a certain amount of sympathy with their basic goals. The ultimate aim of ASH, as I understand it, is to make tobacco smoking a thing of the past. If you were familiar with my personal habits, you might well think I would be eager to see them succeed. I am not *totally* a nonsmoker, in the strictest sense of the word; I have occasionally smoked as many as two or three pipes or cigars in a year, I make no apologies for that fact, and I have taken no vows never to repeat the "offense." But pipes and cigars are not at all essential to my future happiness, and I agree with ASH that, in general, smoking tends to be more harmful than otherwise. I have never even tried a cigarette and have no desire to do so. I am always pleased when a friend or relative gives them up. When offered the choice, I sit in nonsmoking sections of trains, planes, and restaurants; and I am expressly grateful to ASH for past efforts which have helped make that choice more widely available.

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But for me, *choice* is a key word, in regard to smoking or anything else—and that does not seem to be where ASH's emphasis lies. For them, and a growing number of anti-smoking activists not necessarily connected with them, smoking appears to be an evil to be stamped out at almost any cost. I part company with ASH on one of those "two most effective strategies in the war on smoking," because it seems to me to get heavily into other evils which are at least as serious but seem to be far more readily accepted these days.

The strategy I find disturbing (and the one most proudly emphasized in my soliciting letter from ASH) is a new movement toward litigation against tobacco companies. I refer specifically to a growing number of widely distributed suits by sufferers of smoking-related diseases (or their survivors) to collect damages from the companies on the grounds that they were, at least in large part, responsible for the diseases and deaths. What bothers me about this was very nicely summed up by syndicated columnist Ellen Goodman (ironically, in a column *favoring* the suits): "The daily newspaper, the medical establishment, even the cigarette packs these smokers opened, carried warnings about the lethal dangers of cigarettes. Some 45,000 studies documented the link between smoking and ill health. Weren't these consumers responsible for what they inhaled? Didn't they kill themselves?"

In a word, yes. And in the long run, encouraging people to believe otherwise not only does them as individuals a disservice, but is dangerous on several levels to the society that does it.

Yes, I know it's painful to lose somebody to these diseases, and it's hard to say that they themselves were largely if not entirely responsible. It's natural to look elsewhere for a place to put the blame. But the fact remains that they did light their own cigarettes, and they had the option of not doing so—and they were warned loudly and repeatedly of the possible consequences. It's true that for many the option is not easy to exercise. For many smokers, smoking becomes a full-fledged addiction. For them, quitting is far from easy—but it can be done, if the smoker is sufficiently determined. And only he can do it, just as only he could decide to start in the first place. Those who started since the medical hazards were well known have especially little cause for pointing fingers elsewhere. Those who started before the risks were known have less reason to blame themselves—but also, by the same token, less reason to blame the tobacco companies. They didn't know then, either.

Now, I own no stock in tobacco companies and have no special fondness for them. But about the most substantial charge I've heard against them in all this is that they've gone on advertising their products and questioning the studies which most people consider to have established clear links between cigarette smoking and such nasties as lung cancer and heart disease. I don't admire them for the way they've done this, but in all honesty I don't see that it's more reprehensible than much that is taken for

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granted in many other kinds of advertising. I don't admire those either, but why single this one out for special treatment? If you want free speech, you're going to be stuck with people saying things you'd rather they didn't. The way you live with that is by teaching people to watch out for it and to weigh everything they hear critically, because ultimately *they* bear responsibility for the decisions they make about their own lives. Lesson One: The manufacturer is the *last* person to believe about the performance, reliability, or safety of *any* product.

And what of the person who is fully aware of the risks and decides that, for him, the benefits are worth them? To stay with the present example just a little longer, there are people who know what their life expectancies are, with and without smoking, and don't consider the

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somewhat improved odds an adequate trade-off to justify giving up the pleasures they derive from smoking. They can be quite confident that they're going to die sometime, of some cause, and are willing to accept a somewhat increased probability of its being a little sooner and from this cause. (And please note that probabilities, not individual certainties, are all that we're talking about.) In the case of cigarettes, it's not a decision I would make for myself; but I can see no justification for taking it upon myself to overrule someone who has made it with full knowledge of the available facts. I certainly want him to *have* all the facts before deciding—but what he does with them is *his* business. It's his life, not mine.

That, not smoking, is what this is all about. Smoking is just a handy, currently fashionable example—but the fashion for telling other people how to live their lives, and then finding external excuses for them when they mess up, is so widespread that there's no shortage of other examples. Just last night I saw an item about the American Public Health Association campaigning for a total ban on boxing. A spokesman for the group was quoted as saying that, "The risks of injury and death from boxing are unacceptable." What this statement means is that the risks are unacceptable to those who find them unacceptable. It ignores, or implicitly dismisses as not worthy of consideration, the opinions of those who have studied the risks and have demonstrated that for them they *are* acceptable in the sincerest possible way: by willingly accepting them as part of the price of an activity they like. I'm not a boxing enthusiast, either, but I can respect their viewpoint. And I can wonder: what's next? Mountaineering? There's one I do have some personal affinity for. I'm well aware that high-angle climbing is a high-risk sport by any standards (though survival is still far more common than death). I'm also well aware that it offers intangible rewards that some find well worth the risks, and I understand why. I have seen and resented local bans on climbing; I would vehemently oppose any universal ban based on the fact that the actuarial statistics are less favorable than for some other activities. Yet, in the current climate, I can easily imagine its happening.

The other side of the coin—the cheerful transference of blame to someone or something other than the perpetrator of an act—is all too familiar. How often have you heard "society" blamed for some punk killing a retired grandmother for a few dollars and a momentary kick? Or such idiocy as the implication or outright statement that a rape victim is as guilty as the rapist?

I won't deny that any action has not only proximate but indirect contributory causes. It's true that smokers wouldn't smoke if no one made cigarettes; that there would be fewer head injuries if no one were allowed to box; that an old woman who lives alone in a bad neighborhood or a young one who wanders the New York subways alone at night is less safe than one who doesn't. It's true that social conditions make individuals more or less likely to develop

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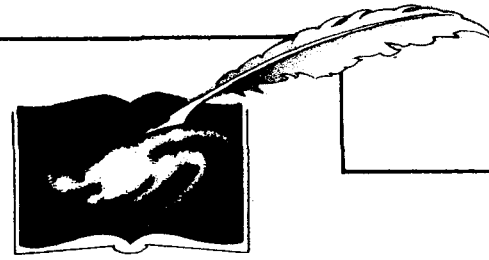

About L. RON HUBBARD's

Writers of the Future Contest

by Algis Budrys

The Writers of the Future contest substantially rewards at least twelve talented new speculative fiction writers each year. With no strings, every three months it confers prizes of $500, $750 and $1,000 for short stories or novelettes. In addition, there's an annual Master Prize of $4,000. All awards are symbolized by trophies or framed certificates, so there's something for the mantelpiece too.

There's also a Writers of the Future anthology, which I edit. (There was one last year, and there's another one just out as you read this.) It offers top rates for limited rights in the stories. These payments are in addition to any contest winnings. The anthology is distributed through top paperback book retailers everywhere, and is kept in print and on sale continually. All that's required to win or to be a finalist is a good new story, any kind of fantasy or science fiction, no more than 17,000 words long, by writers whose published fiction has been no more than three short stories or one novelette. Entry is free.

The contest deadlines in 1986 are March 31, June 30, and September 30, and there are First, Second and Third prizes for each three-month quarter. At the end of our year, a separate panel of judges awards a Master Prize to the best of the four quarterly winners. So one person will win a total of $5,000. Judging panels include or have included Gregory Benford, Stephen Goldin, Frank Herbert, Anne McCaffrey, C.L. Moore, Larry Niven, Frederik Pohl, Robert Silverberg, Theodore Sturgeon, Jack Williamson, Gene Wolfe and Roger Zelazny, as well as me. Matters are administered so that the judges are totally independent and have the final say.

It seems hardly necessary to embellish the above facts with any enthusiastic adjectives. This contest was created and sponsored by L. Ron Hubbard and the project will continue in 1986 and try to do some realistic good for people whose talent earns them this consideration. For complete entry rules, and answers to any questions you might have, write to the address given below:

Don't Delay! Send Your Entry To:

Writers of the Future Contest
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Or, you can find the rules—and examples of winning stories, plus informative essays by some of the judges—in either of the Writers of the Future anthologies. They're original paperbacks and cost $3.95 each.

Good luck.

—Algis Budrys

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criminal tendencies. But it's also true that no one has to smoke unless he puts a cigarette in his mouth and lights it; that some people enjoy smoking or boxing or climbing enough to knowingly run the extra risks they entail; that no one gets mugged unless a mugger decides to attack; that blaming "society" makes it awfully easy for a person of weak character to shrug off his own responsibility for his actions.

A society does have a responsibility to its members: to provide an environment of reasonable safety from *external* dangers in which people can pursue their own goals to the best of their abilities. But that social responsibility, and the long-term viability of the society itself, are not well served either by telling people they may not make some choices at all, or by allowing them to blame someone else for the consequences of the ones they do make. Banning actions reduces options, both for individual happiness and for resources available to the society as a whole. Institutionalized buck-passing fosters a populace more skilled in making excuses than in making sound decisions—and a society is only as strong as the people who compose it. A far more rewarding course, currently out of fashion, would be to cultivate and demand *individual* responsibility: to make it clear to every individual that he alone bears the ultimate responsibility for everything he does, and to help him develop early in life the wisdom and judgment to make decisions that neither he nor anyone else will regret. ■

FRANK HERBERT, 1920-1986

The December 1963 issue of *Analog* carried the first installment of a serial called *Dune World*, beginning one of the most popular series of science fiction novels ever written. *Dune*, the first book of the series, did not appear as such until 1965, but it and its several sequels have remained in print continuously since their first appearance. The desert planet Arrakis is considered by many the most convincing, and surely one of the most elaborately detailed and fully realized worlds ever created by a science fiction writer.

Frank Herbert, creator of *Dune*, was born in 1920 in Tacoma, Washington. He died February 11, 1986, in Madison, Wisconsin, of a blood clot that formed in his lung while he was recovering from cancer surgery. In addition to *Dune*, he will be remembered for several other novels (including *Under Pressure*, *Hellstrom's Hive*, and *The Dosadi Experiment*) and short stories.

I only met Frank once in person, and once or twice by telephone. In those few brief encounters, totaling little more than an hour of conversation, he left the indelible impression of a man of extraordinary intelligence and integrity, both easy and invigorating to talk to. I'm very sorry there won't be any more chances.

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A TALE OF THE FIELDS

Milgrim Popper, the planetary explorer, lost his life on Desmodus, the Vampire World. Attacked by one of the planet's semi-human inhabitants, he defended himself by swinging at it with a great cudgel which he carried in order to ensure a supply of cudgelled brains, one of his favorite dishes.

The cudgel shattered the creature's arm exactly midway between shoulder and elbow. Popper, doubtless thinking that the creature would fall back in dismay, dropped the cudgel and stepped forward; whereupon the creature turned into a bat.

The break in the human arm corresponded exactly to a hinge in the bat's wing; if Popper had shattered the arm at any other place, less exactly, the wing would have been crippled and the creature, unable to fly with precision, would have fluttered helplessly until Popper, recovering his cudgel, might have killed it.

But the break was exactly on the hinge, and the bat, therefore undamaged, attacked Popper and drained him in a matter of seconds.

It is from this sad tale that we derive one of the important maxims for planetary exploration:

Never give a sucker an even break. ■

Laurence M. Janifer

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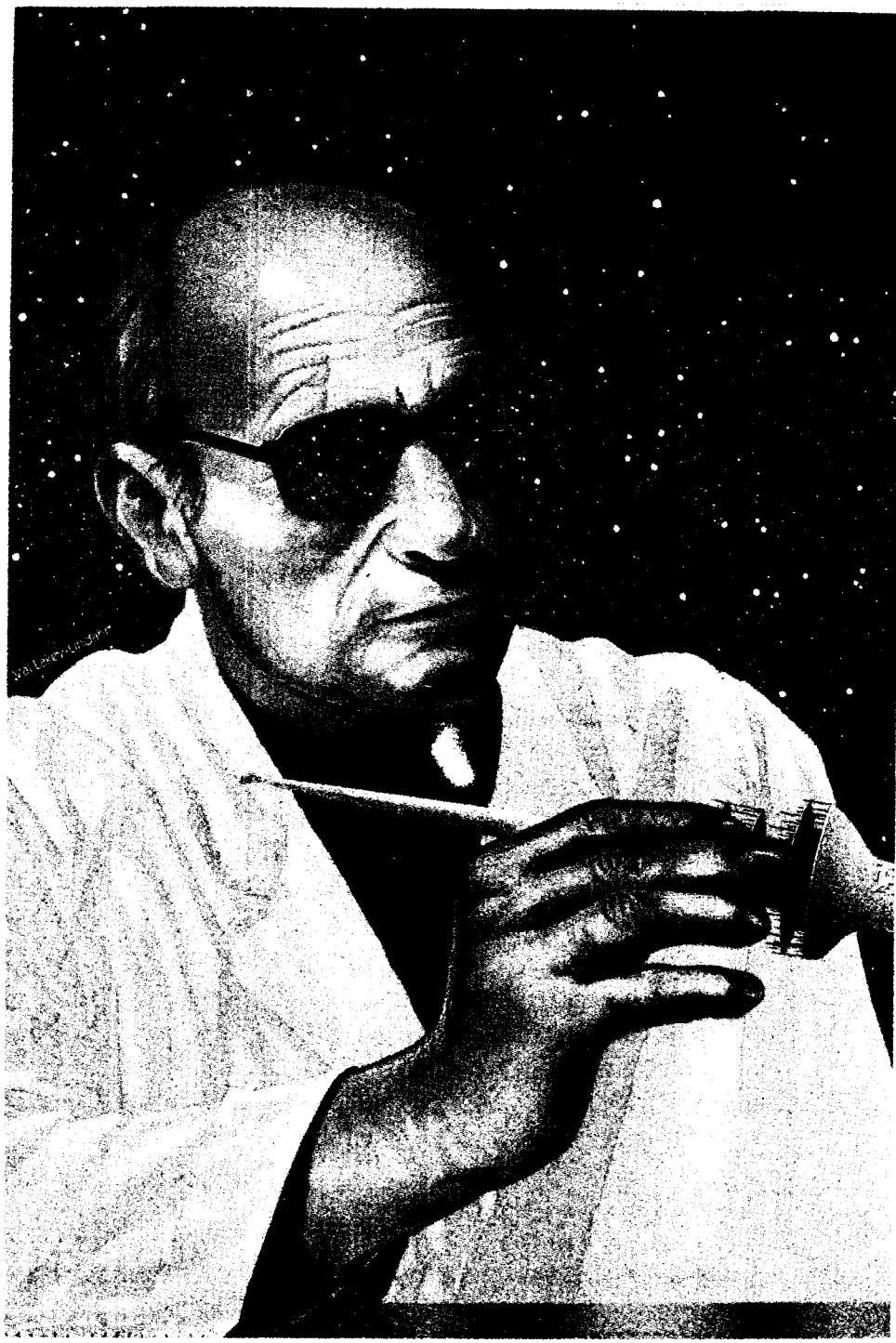

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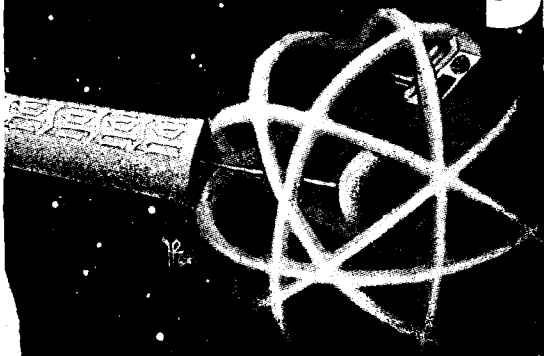
Timothy Zahn

THE EVIDENCE OF THINGS NOT SEEN



It's hard enough to decide what to do when you can *see* what the problem is. But when you know only that you *don't* see something that you should. . . .

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Omens.

There are men in space today who'll tell you, in all apparent sincerity, that every major star ship disaster is preceded by an omen of one kind or another. I suppose most of those who say that don't really believe it, but I *have* seen crewers walk off a ship half an hour before launch because they thought a rash of snafus in the countdown checks meant the ship would disappear into a cascade point somewhere in the near future. Superstitious nonsense, of course, and I can prove it—because the day the *Aura Dancer* lifted for the last time was just as smooth and trouble-free as polished teflene.

I mean that; and for a struggling tramp starmer like the *Dancer* that's a minor miracle all in itself. Wilkinson and Sarojis had the cargo stowed away twenty minutes ahead of schedule, Matope ran a complete check of the *Dancer*'s systems without finding a single malfunction that Baroja's overly stuffy tower controllers could frown at; and Matope's success meant Tobbar was available to welcome our handful of passengers aboard, a task which traditionally falls to a ship's captain but which I've almost always successfully avoided. About the only thing that could remotely have been considered a problem was that Alana Keal, my second-in-command, nearly missed the boat.

She buzzed in about fifteen minutes before our scheduled lift, and I *do* mean buzzed. All the worry and guilt on her face couldn't mask the fact that she'd just been through some very serious celebrating with some old friends and was running a good two points above cruise velocity. "Sorry I'm late, Pall," she apologized with the slight breathlessness of having come from the hatchway to the bridge at a dead run. "Did you have to drop us in the lift pattern?"

"No, I was going to give you another five minutes before I called the tower," I told her as she slid into her chair.

"They'd have had your head," she said, keying for a systems check. "You're supposed to give them twenty minutes' notice of a delay."

"Life is tough all over," I shrugged, watching her fingers skate over the keys. For a moment I considered telling her all the pre-lift checks had been done, but changed my mind. Alana was the serious type who insisted on pulling her own share of the load, and there was no point making her feel any worse about her tardiness. Not that she was really feeling bad now, but it would eventually catch up with her. "So . . . how did the *Angelwing* take the news that they had a new captain?"

She laughed, a sparkling splash of sound we heard all too seldom aboard ship. "The funny thing is that they really *do* have one. Old Captain Azizi's finally retired, and Lenn Grandy's been promoted."

"Ah." The name was vaguely familiar; one of Alana's fellow junior officers during the year she'd been on the *Angelwing*. "I presume you compared notes on which of you got the captaincy first?"

"Oh, we tried, but we ran into the usual simultaneity problems. He probably made it first, though."

"Well, I bet you look better in the captain's uniform than he does."

She glanced a smile up at me. "Why, thank you, Pall. Maybe sometime this

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trip you can stay with me during a cascade point and see for yourself."

Right then I decided she was unfit to be poking around the *Dancer's* bridge controls. Going through a cascade point alone is about as much fun as an untreated double hangover; doing it with someone else is even worse. "We'll see about that," I told her. "But for now *you* are going to your cabin until whatever Grandy and his fellow clock-watchers were plying you with wears off."

"They're not clock-watchers—Cunard's just very touchy about keeping their liners on schedule," she protested. But she obediently got to her feet and headed for the door. "Just remember, I've got first cascade point duty in four hours."

"We'll see if you're up to it," I called after her, a line that permitted me to be basically honest while still avoiding an argument. Physically, she'd certainly be up to doing the point by then. But emotionally—

Emotionally, she would still be carrying the warm glow of the celebration and the triumph of a "captaincy" which, though purely imaginary, was in another sense very real.

And I had no intention of letting cascade point duty ruin that for her quite so quickly.

Four hours later I was alone on the bridge, and ready for the first cascade point.

The *Dancer* was quiet. All her sensors and control surfaces had been shut down, all electronics including the computer put into neutral/standby mode. The crewers and passengers were shut down, too, the sleepers Kate Epstein had administered guaranteeing they would all doze blissfully unaware through the point. They were ready, the *Dancer* was ready; and postponing the inevitable gained nothing for anyone.

Lifting the safety cover, I twisted the field generator knob . . . and watched as the cascade pattern began to fill up the room.

Someone early in the Colloton Drive's history, I'd once heard, had described the experience as being like that of watching some exotic and rapid-growing crystal, and there'd been times I could see it myself on almost that high of an intellectual level. The first four images that appeared an arm's length away were quickly joined by the next set, perfectly aligned with them, and then by the third and fourth and so on, until I was at the center of an ever-expanding horizontal cross of images.

Images, of course, of me.

Land-bound philosophers and scientists still had lively arguments as to what the effect "really" was and what the images "really" represented, but most of us who saw them regularly had long since come to our own conclusions, minus the fine details. The Colloton Drive puts us into a different kind of space . . . and somehow it links us through to other realities. The images stretching four ways toward infinity were hints of what I would be doing in each of those universes.

In other words, what my life would be like if each of my major decisions had gone the other way.

I spent a moment looking down the line, focusing on each of the semi-transparent images in turn. Four figures

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away, conspicuous among the jumpsuits and coveralls on either side of it, was an image of myself in the gold and white of a star liner captain.

I didn't regret the decision I'd made a year earlier that had lost me that universe, but the image still sometimes raised a reflexive lump into my throat. I had the *Dancer—my* ship, not some bureaucracy's—and I was satisfied with my position . . . but there was still something siren-song impressive about the idea of being a liner captain.

And if anyone aboard ship had had any doubts about that, the living proof would be taking over for me as soon as this cascade point was past.

Reaching to the small section of control board that still showed lights, I activated the *Dancer*'s flywheel. The hum was clearly audible in the silence, and I shifted my gaze to the mirror that showed the long gyroscope needle set into the ceiling above my head. Slowly, as the flywheel built up speed, the needle began to move. The computer printout by my elbow told me the *Dancer* needed a rotation of three point two degrees to make the four point four light-years we needed for this jump. It was annoying to have to endure a cascade point for such relatively small gain—the distance traveled when we left Colloton space went up rapidly with the size of the yaw angle the ship had rotated through—but there was nothing I could do about it. The configuration of masses, galactic magnetic field, and a dozen other factors meant that the first leg of the Baroja/Earth run was always this short. And it *was* accounted for in our—as usual—tight schedule. So I just leaned back in my chair, did what I could to ease the induced tension that would turn into a black depression when we returned to normal space, and thought about Alana. Alana, and her phantom captaincy.

It had been on the last cascade point coming in to Baroja that she'd first seen the gold-and-white uniform in her own cascade image pattern, tucked in there among the handful of first- and second-officer dress whites that represented the range of possibilities had she stayed with the *Angelwing*. She'd caught the significance immediately, and the resulting ego-boost had very nearly gotten her through the point's aftermath without any depression at all. She'd left the liner four years back for reasons she'd apparently never regretted, which put the new image into the realm of pleasant surprise rather than that of missed opportunity. A confirmation of her skills; because had she stayed aboard the liner, *she*, not Lenn Grandy, would be captain today.

Or so the theory went. None of us who believed it had ever come up with a way to prove it.

The gyro needle was creeping toward the three-degree mark now. Another minute and I'd shut the flywheel down, letting momentum carry the *Dancer* the rest of the way. A conjugate inversion bilinear conformal mapping something something, the mathematicians called the whole thing: a one-to-one mapping between rotational motion in Colloton space and linear translation in normal space. Theorists loved the whole notion—elegant, they called it. Of course, they never had to suffer the drive's side effects.

But then, neither did most anyone

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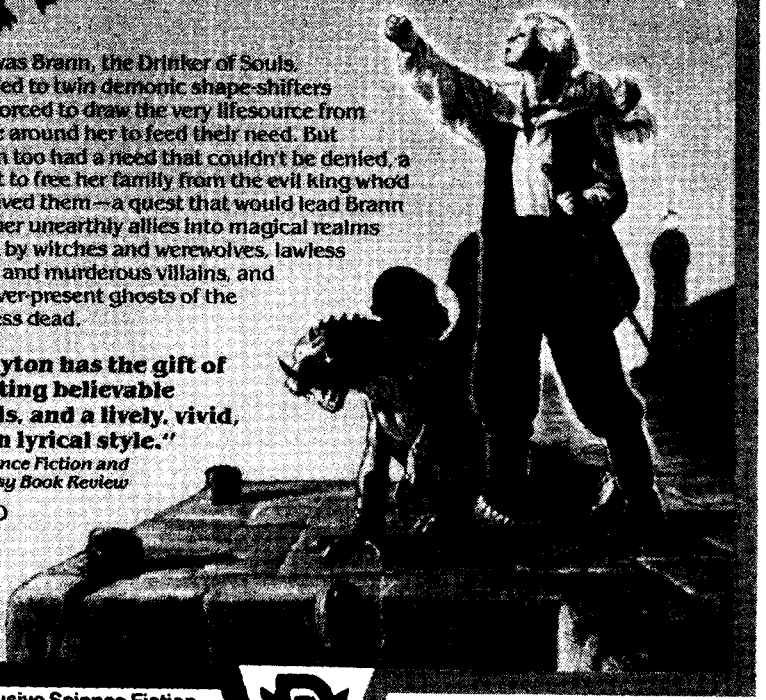

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DAW FANTASY

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else these days. The Aker-Ming Autotorque had replaced the old-fashioned manual approach to cascade maneuvers aboard every ship that could afford the gadgets. The *Angelwing* could do so; the *Dancer* and I could not. I wondered, with the first hint of cascade point depression, whether Alana would spend her own next point regretting her decision to join up with me.

Three point one degrees. I flipped the gyro off and, for no particular reason, turned my attention back to my cascade pattern.

The ship was still rotating, and so the images were still doing their slow dance, a strange kaleidoscopic thing that moved the different images around within each branch of the cross. A shiver went up my back as I watched: that complex interweaving had saved my live once, but the memory served mainly to remind me of how close I'd come to death on that trip. Automatically, my eyes sought out the pattern's blank spots, those half-dozen gaps where no image existed. In those six possible realities I *had* died . . . and I would never know what the decision had been that had doomed me.

Or whether I might yet make the same fatal choice in this, the real universe. Shivering again, I turned my eyes resolutely away.

The gyro needle had almost stopped. I watched it closely, feeling afresh the sensation of death quietly waiting by my shoulder. If I brought the *Dancer* out of Colloton space before its rotation had completely stopped, our atoms would wind up spread out over a million kilometers of space.

But the spin lock holding the field switch in place worked with its usual perfection, releasing the switch to my control only when the ship was as close to stationary as made no difference. I flipped the field off and watched my cascade images disappear in reverse order; and then I drew a shuddering breath as my eyes filled with tears and cascade point depression hit like a white-capped breaker, dragging me under. I reactivated the *Dancer*'s systems and, slumping in my seat, settled down to ride out the siege.

By dinnertime two hours later the ship and crew were long back to normal, and the passengers were showing signs of life, as well.

Or at least some of them were. I reached the dining room to find a remarkably small crowd: three of our eight passengers plus Alana, Tobbar, and Matope. They were grouped around one of the two tables, with two seats to spare. "Good evening, all," I said, coming forward.

"Ah—Captain," Alana said, a look of surprise flicking across her face before she could catch it. "I was just explaining that you probably wouldn't be able to make it down here for dinner."

A fair enough assumption, if not entirely true: I usually managed to find a plausible reason to avoid these get-togethers. But a chance comment Tobbar had made when reporting the passengers were all aboard had made me curious, and I'd decided to drop by and see the phenomenon for myself. "I probably won't be able to stay very long," I said aloud to Alana and the table at large. "But I'd hoped at least to be able to personally welcome our passengers

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aboard." I cocked an eyebrow at Tobbar.

He took the cue. "Captain Pall Durriken, may I present three of our passengers: Mr. Hays Trent, Mr. Kiln Eiser, and Mr. Rollin Orlandis."

Trent and Eiser were youngish men, with what seemed to be very athletic bodies under their business suits and smiles that somehow didn't reach their eyes. I said hello and turned my attention to Orlandis . . . and found that Tobbar had been right.

Orlandis didn't belong on a ship like the *Dancer*.

That much I got in my first quick glance; but as my brain switched to logic mode to try and back up that intuitive impression, I realized it wasn't nearly as obvious a conclusion as I'd thought. His suit, which had seemed too expensively cut for a tramp starmer passenger, turned out to be merely a small jump above the outfits Trent and Eiser were wearing, not much more than twice what I could afford myself. His ring and watch looked new but ordinary enough; his vaguely amused look no worse than others I'd seen directed the *Dancer*'s way. But *something* about the man still felt wrong.

I apparently hesitated too long, and the conversational ball was plucked neatly from my hands. "Good evening, Captain Durriken," Orlandis said, giving me an easy, not-quite-condescending smile. His voice was quiet and measured, with the feel of someone used to being listened to. "First Officer Keal has been explaining the ins and outs of the *Aura Dancer* to us, and I must say it sounds like a fascinating craft. Would you be able to spare her a bit later in the journey for a guided tour? Say, tomorrow or the next day?"

The question was put so reasonably it seemed impossible not to simply say *yes*. But my speech center had long-standing orders on this topic. "Actually, Mr. Orlandis, Mr. Leeds and Dr. Epstein usually handle passenger tours. If you'd like—"

"I'd prefer Ms. Keal."

For a moment my tongue tangled around itself with confusion. Orlandis hadn't raised his voice, hadn't so much as cocked an eyebrow, but suddenly I felt like a child . . . or an underling.

And if there was anything guaranteed to pull my control rods it was someone pushing me around who didn't have the right to do so. I was ungluing my tongue to say something approximating that when Alana jumped in. "If you don't mind, Captain," she said, "I have no objections to showing Mr. Orlandis around during my off-duty hours."

I looked away from Orlandis's steady gaze to find Alana staring just as intently at me, a hint of pleading in her expression. *Don't anger the passengers*. With a supreme effort of will I gave in. "Very well," I said, turning back to Orlandis. "You and Ms. Keal may make your own arrangements on this. Please bear in mind that her work schedule may need to change on short notice; ships like the *Aura Dancer* are almost by definition always short of hands to do the necessary work."

He nodded once, a simple acknowledgment without any detectable trace of triumph to it. He was *used* to being obeyed; pure and simple. "It will be, what, another five days until the next cascade maneuver?"

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"About that," I told him, wishing obscurely that I could rattle off the precise time to him, in days, hours, *and* minutes. "You'll have plenty of warning; don't worry."

"I wasn't. Will the food be much longer?"

I glanced at Tobbar, who had presumably been there when they all submitted their orders. "Another minute or two; no more," he told Orlandis. "Our autochef is getting a bit old and sometimes takes its time filling orders."

"These things happen," Orlandis said equably. "Captain, I don't believe you've ordered yet."

An invitation to an entire evening of cat-eat-mouse sparring? Perhaps; but if it was, I was going to take the coward's way out. "I'm sorry; but as I said, I won't be able to stay," I told him, getting to my feet. "There's some work on the bridge I need to attend to. Please enjoy your dinner, and I expect I'll be talking with you all again soon."

"Perhaps under more relaxed conditions," Orlandis said. "Good evening, Captain."

I turned, and as I did so the autochef beeped its announcement that dinner was finally ready. Assured that they all had something more interesting than me to occupy their attention, I made my escape.

I went to the bridge, kicked Pascal out—it was his shift, but he had some maintenance work on the computer he wanted to do anyway—and pulled a copy of the cargo manifest. Just for something to do, actually . . . but when Alana stopped in an hour later I was still studying it. "Dinner over already?" I asked her as she slid into her chair and swiveled it to face me.

"More or less," she said, eying me closely. "Orlandis and Tobbar are going hard at a discussion on governmental theory. I get the impression Orlandis knows a lot about the subject."

"Good—maybe we'll finally find out if *Tobbar* does, then."

She smiled. Tobbar could talk at length on practically any subject, and most of us on the *Dancer* had long since given up trying to figure out which ones he was simply wool-pulling us on. "He'll probably lose whether he does or not," she said. "I also get the impression Orlandis is in the habit of winning his arguments."

I grunted. "You noticed that, did you?"

"Come on, Pall—it's no big deal if I play tour guide for a couple of hours. I've done it before, you know."

"It's the principle of the thing," I told her stiffly. "Passengers don't give a ship's captain orders."

Her eyebrows rose at that. "He never *ordered* you to let me show him around. You could have said no anywhere along the line."

"After you cut the landing skids out from under me?" I retorted. "Come on, now—I couldn't very well fight *both* of you."

"And you shouldn't fight with *passengers* at all," she shot back. "I was trying to give you a dignified way out; if you're hot about that, take it out on me, not him. But bear in mind I was doing you a *big* favor in there."

"How do you figure *that?*"

She flashed an impish smile. "He

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could have asked *you* to show him around."

I held onto my frown for another second before giving up and grudging her a twisted smile in return. "I can't win *any*thing today, can I?" I muttered, only half joking. "Oh, all right. I owe you one. If Orlandis was bound and determined to cause me trouble he missed his biggest chance."

"I don't think that was what he was up to," she demurred thoughtfully. "I think he's just used to the very best of everything."

"Then the change here should do him good," I snorted.

She gave me a *now, now* sort of look and waved at the manifest in front of me. "Trouble with the cargo?"

"Not really." I shook my head, glad to have a change of topic. "Just trying to figure out why we've suddenly attracted new customers."

"What do you mean?"

"Well, I didn't notice it before, but nearly a quarter of our cargo space is being taken up by four large crates coming from two companies we've never done business with."

She got out of her seat and peered over my shoulder. "Huh. Are we the only ship heading between Baroja and Earth at the moment? If they need to get the cargo there right away that might explain it."

And also explain why someone like Orlandis would stoop to our level? "Maybe, but that seems unlikely. Didn't you say the *Angelwing* was even going to Earth this trip?"

"Yes, but by way of Lorraine. They won't arrive until a month after we do."

I sighed. "Well, I suppose it's not impossible. Seems pretty odd, though."

"Maybe I can poke around the question with Orlandis tomorrow," Alana suggested. "He's a businessman; he ought to know about shipping schedules and all."

"What business is he in?"

Her forehead furrowed. "Now that you mention it, I don't think he ever actually said," she told me slowly. "Though I got the impression it was something important."

"He ought to be on a commercial liner if he's that rich," I grumbled.

"Unless," she said quietly, "he's afraid of people."

I looked up at her, feeling my stomach tighten reflexively. Alana had made practically a second career for herself years back as a mender of bruised spirits and broken wings; had overdosed on the loss and pain that nearly always seemed to come with the job; and was only in the last year or so taking her first tentative steps out from behind the self-erected barriers. If Orlandis was aboard because he was psychologically unable to mingle with the masses of people on a standard liner, then she probably had enough of a challenge to last her the rest of the trip. "Well, if he is he's picked a lousy place to hide," I growled. "Not much real privacy on this albatross."

She touched my shoulder gently. "Don't worry about me," she said. "Orlandis doesn't scare me."

"Um," I said brilliantly, and for a moment we were both silent. Then she took a tired-sounding breath and stepped toward the door.

"I'd better head downstairs and get some sleep," she said. "You ought to

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do the same, you know—and it *is* Pascal's shift."

"In a minute," I told her. "Goodnight."

"'Night."

She left, and with a sigh I called back to the computer room and told Pascal to finish whatever he was doing and get back to the bridge. It wasn't any business of mine if Alana wanted to play emotional counselor on her own time. It wasn't my business *whatever* she did with her own time. She was all grown up and fully in charge of her life.

Pascal arrived, and I headed down to my cabin. Eventually, I went to sleep.

I spent the next five days walking around on mental tiptoe, waiting for trouble of one type or another to spark between Alana and Orlandis. But all I got for my trouble was the mental equivalent of strained arches. I saw them only once myself as they passed through the engine room, and to all appearances their relationship was running on a strictly proper crewer/passenger level. Certainly Alana was well on top of things; I had ample opportunity to chat with her between our bridge shifts and at occasional meals in the duty mess, and she showed no strain that I could detect.

I also got to meet the rest of the passengers as they found their space legs and dribbled one by one out of their cabins. No big deal, as usual; they ran the *Dancer*'s usual range of semi-scruffy to reasonably respectable, their occupations mainly in the academic or lower-middle business sectors. I suppose my major reaction to the whole bunch was relief that there weren't any more like Orlandis among them.

Meanwhile, with the ship largely running itself, I spent a couple of duty periods trying to make some sense out of the mysterious first-time clients represented so heavily in our cargo holds. But our computer records had limited information on business and financial arcana, and my attempts to trace through parent firms, holding companies, managing directorates, and so forth all ended quickly with zero results. Eventually, I concluded that word of mouth must have been kinder to the *Dancer* than I realized. Either that, or we really *were* the only ship that had been heading straight to Earth.

And then the *Dancer* came up on its second scheduled cascade maneuver out from Baroja . . . a maneuver I will never forget as long as I live.

It was Alana's turn to handle the point; and I wasn't yet entirely out of the mind-numbing sleeper state when I pried my eyes open to find her sitting on the edge of my bed, one hand shaking my arm as tears rolled down her cheeks. 'Wha's wron'?" I slurred, trying to at least sit up but finding my body in worse shape than even my brain was. "'Lana —wha's *wron'?*"

Her face was filled with horror and pain and hopelessness as she fixed blurry eyes on me—a cascade depression times a thousand. "Oh, Pall," she managed to get out between sobs. "It's gone—the *Anglewing* is *gone*. And—and *I died with it.*"

And with that the storm broke again . . . and she buried her face in my shoulder, sobbing like she would never stop.

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* * *

I held her close to me for nearly an hour, until her mind and body were simply too exhausted to cry any more. And only then did I finally find out exactly what had happened . . . and if it wasn't quite as nerve-chilling as her seeing her own death, it was plenty bad enough.

"I'd started the *Dancer*'s rotation," she said, her voice trembling with emotional fatigue and the echoes of her horror. "I was watching the cascade images, thinking about Aker-Ming Autotorques and wondering whether I'd trust one even if we had it . . . and I was looking at the image of me as the *Angelwing*'s captain when it—when it just disappeared. There's nothing there now but another gap."

In my mind's eye I watched it happen . . . and nearly started crying myself. I'd known people who'd been forced to watch helplessly as a loved one died; had seen the way a trauma like that could make a person a bag of broken glass. And to see it, in effect, happen to *yourself* . . .

I tried to find words of comfort to say, but without success. So I just continued to hold her, and after a minute she spoke again. "They *are* dead, aren't they? All the people aboard the *Angelwing?*"

"I don't know," I said honestly. "Maybe not. Maybe it just means you would have made some mistake if you'd been in command. I mean—maybe your friend Lenn did something else and the ship's okay."

"I've been trying to think of some way a captain could get killed without the rest of the ship dying, too," she said, still talking into my shoulder. "But the *Angelwing*'s a *liner*—a *Cunard* liner, yet. It's got failsafes on the failsafes, the best medical facilities you can get—"

She trailed off. Unfortunately, she was right. I was plenty familiar with liner facilities myself, and there were damn few accidents that could conceivably happen that the medics aboard couldn't handle. "Could you tell what your image was doing?" I asked her. "I mean . . . did it look in pain or sick or anything?"

"I don't think so. It was just . . . there . . . like all the others." She took a deep breath and finally pulled away from me. Her face looked terrible, all red eyes and pain. "I guess I'd better get back upstairs. I haven't computed position or—"

"Never mind all that," I told her. "I can do it after we get you in bed and have Kate give you a sedative."

"No, I'm okay." She attempted a smile that didn't even come close and got to her feet. "Really. Thanks for the listening ear."

I stood up, too. "I'll help you to your cabin."

She tried to argue, but her heart clearly wasn't up to even that much effort. Five minutes later Kate Epstein was tucking a blanket under her chin and making the soothing sort of sounds doctors traditionally make while waiting for their potions to take effect. I hung around in the background until Alana's eyes began to glaze over, and then headed to the bridge. By the time I'd finished the position check and cleaned up the various odds and ends of the maneuver the rest of the crewers were starting to call in to find out what the

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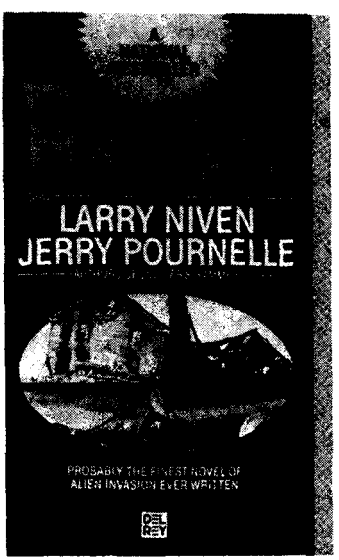

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hell had happened to Alana. I told the story twice, then just gave up and pulled everyone in on the crew intercom hookup for one final rendition. They were as shocked as I'd been, and equally at a loss as to anything we could do to help her. I got two offers to relieve me on the bridge, turned down both of them, and sent them all back to whatever they'd been doing.

We all sort of limped along at half speed for a couple of days after that. Alana spent the first one alone in her cabin before venturing out to return to duty, claiming she was recovered enough to function as first officer again. I pretended to believe her and juggled her back into the shift schedule . . . and as I kept a close eye on her, I decided she really *was* up to it. In retrospect, I suppose, I shouldn't have been all that surprised; anyone who mended other people's traumas for a hobby would have to come equipped with a high degree of emotional toughness.

I wasn't nearly so tough, though; and if I'd thought I was, I found out otherwise when I came off the bridge on the third day to find Orlandis waiting for me on the command deck.

"Good afternoon, Captain," he said smoothly. "I wonder if I might speak to you for a moment."

"Mr. Orlandis," I nodded, staying civil with a supreme effort. "This area is off-limits to passengers."

"Yes, I know. As I said, though, I wanted to have a quiet word with you."

I glanced down the hall. Near the spiral stair leading down to the passenger deck I could see either Eiser or Trent—I couldn't tell which of the two passengers it was—reading the little cartoons Pascal liked to put up by the computer room door. It never failed, I thought with a flash of disgust: let one passenger wander where he wasn't supposed to, and pretty soon you'd find the rest following. Two-legged sheep, the whole lot of them. "We can talk down in the lounge," I told Orlandis shortly.

"Or perhaps as we walk," he said, starting leisurely toward the stairway.

I took two long strides and settled into step beside him, already wondering if there was some legal or at least practical way to block off that stair. "If there's a problem with service or accomodations—"

"Then Leeds is the man to see. No, Captain, this is something quite different. I was wondering about the rumors circulating about something happening to Ms. Keal during the last cascade maneuver."

My murderous thoughts toward the passengers switched to murderous thoughts toward the crew. The one single order I'd issued on this was that the passengers were *not* to get even a whiff of what had happened. "I'm not sure what you're referring to," I said carefully. "Ms. Keal had a slightly more traumatic reaction than usual to the cascade point, but she's certainly up and about now."

Facing forward with my eyes locked on Eiser ahead, I could still tell Orlandis was smiling. "Come now, Captain, we don't have to play these games. I assure you anything you tell me will go no further."

A great confidence-builder, if I'd ever heard one. Still, even walking slowly, we were getting within earshot

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of Eiser, and if one person with a rumor was bad, two would be even worse. "Suppose you tell me what exactly you've heard," I suggested, for lack of a better idea.

"I heard she saw something terrible in her cascade images," Orlandis said. "Something that indicated a ship—possibly even the *Aura Dancer*— was going to be destroyed."

I groaned inwardly, making a note to personally strangle whoever had let this mangled version slip. "The *Aura Dancer* is in no danger whatsoever," I told Orlandis. "Another liner *may* have suffered damage—"

"Or been destroyed?"

"*Or* even been destroyed," I snarled. "But that's all strictly conjecture. Do you know anything about cascade images?"

"Some of the theory, but I've never seen them myself."

"Well, then you at least know that the images represent *possibilities*, not realities. What Ms. Keal saw may or may not have anything to do with the real universe."

"But regardless, the *Aura Dancer* itself is not in danger?"

"None at all."

Orlandis nodded. "I see. Thank you for putting my mind at ease."

The idea of his mind being any more at ease than it always seemed to be anyway was faintly ludicrous, but I wasn't in the mood to appreciate the irony. We'd reached Eiser now and I told him briefly that he didn't belong up here. His immediate and highly embarrassed apology nearly made up for Orlandis's lack of same, and I felt a little better as I watched the two of them go down the stairway. Following, I made sure the "Off Limits to Passengers" sign was indeed still prominently posted, and then headed back upstairs to the bridge.

Alana still didn't have all of her fire back, but she was as firm and adamant as she could be without it. "No, I certainly did *not* tell Orlandis anything," she said when I'd described my little confrontation with the man. "I was told you'd given orders not to spread it about."

"I did," I growled, already making a mental list of the next likely suspects. Orlandis didn't have the same access to most of them that he had to Alana, but obviously that hadn't mattered to someone. Sarojis, possibly—he talked as much as any other two aboard. Leeds and Kate Epstein? They were reasonably discreet, but they worked most directly with the passengers and Orlandis could be pretty overwhelming—

"Just forget it, Pall," Alana sighed.

"Forget what?"

"Raining fire on anyone's head. So the passengers know—big deal. As long as there's no panic, I can handle any extra stares and whispers. Whoever spilled probably feels bad enough as it is."

I took a deep breath, let it out slowly. She was right, of course. As usual. "Oh, all right." I tried another breath and was more or less back to normal. "You going to do a check of my calculations for the next point?"

"Already started." She licked her lips and looked up at me. "I'd like to do this one, Pall, if you don't mind."

"Just to prove you can handle it?" I shook my head. "Thanks, but it's my turn."

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"But I still owe you one—"

"Then we'll settle things later in the trip," I told her firmly. "You're not up to it yet."

"If I'm not up to it *now*, when will I be?"

"All right, then; *I'm* not up to letting you do it. Okay?"

She glared at me for a minute, but then the brief spark faded. "Okay," she sighed. "If you're going to make it an order."

"I am," I nodded, knowing at that point that I had indeed made the correct decision. If she wasn't strong enough to argue with me, she almost certainly wasn't strong enough to handle a cascade maneuver. "Just make sure I got all the numbers entered properly. Talk to you later."

I left, trying not to feel like an overprotective mother. I *would* handle the next cascade maneuver, whether it bothered her pride or not.

And as it turned out, it was probably a good thing I did.

Below me the flywheel was humming its familiar drone, and in four directions the cascade images had begun their intricate saraband. Among them, like departed dance partners whose places no one had dared to take, the six dark gaps wove in and out as well. Always, their presence was noticeable; today, it was almost overwhelming. Gaps . . . flaws . . . voids—mortality underlined. I wondered how I would feel to see one of my own images wink out like Alana had . . . wondered if I'd be able to handle the shock as well as she had.

I doubted it. I'd had my share of nightmares about losing the *Dancer*; had come close to actually doing so on at least one occasion. To know that, even in another reality, I was capable of killing myself, my crew, and my passengers through some foolish decision wasn't something I was prepared to face.

And right about then all the relays in my brain went click together, and I stared at the gaps in the pattern as suddenly everything that had made sense five days ago ceased to do so.

I finished the maneuver on sheer brain stem reflex, and five minutes afterward was in Alana's cabin. It took me another fifteen to shake her adequately awake, by which time most of my depression had passed.

"Pall?" she asked, concern beginning to show through the fog.

"Relax," I told her. "I think I may have good news for you. Maybe. Tell me, was it *only* your captain's image that vanished? None of the ones around it?"

"Uh-huh. Why?"

She would have gotten it in a minute, but I was too impatient to wait for her to wake up all the way. "Because the two or three on either side of the captain's image were of you as a subordinate officer on the *Angelwing*. You see? If the ship had died *those* should have disappeared, *too*."

Her eyes widened as it finally penetrated. "Then . . . the *Angelwing*'s still all right?"

"It *has* to be. Look, consecutive cascade images are usually pretty similar, right? So whatever happened to the captain should *also* have happened to the first officer next to it in the pattern. Only it didn't, because the captain's gone but the first officer's still there. With you

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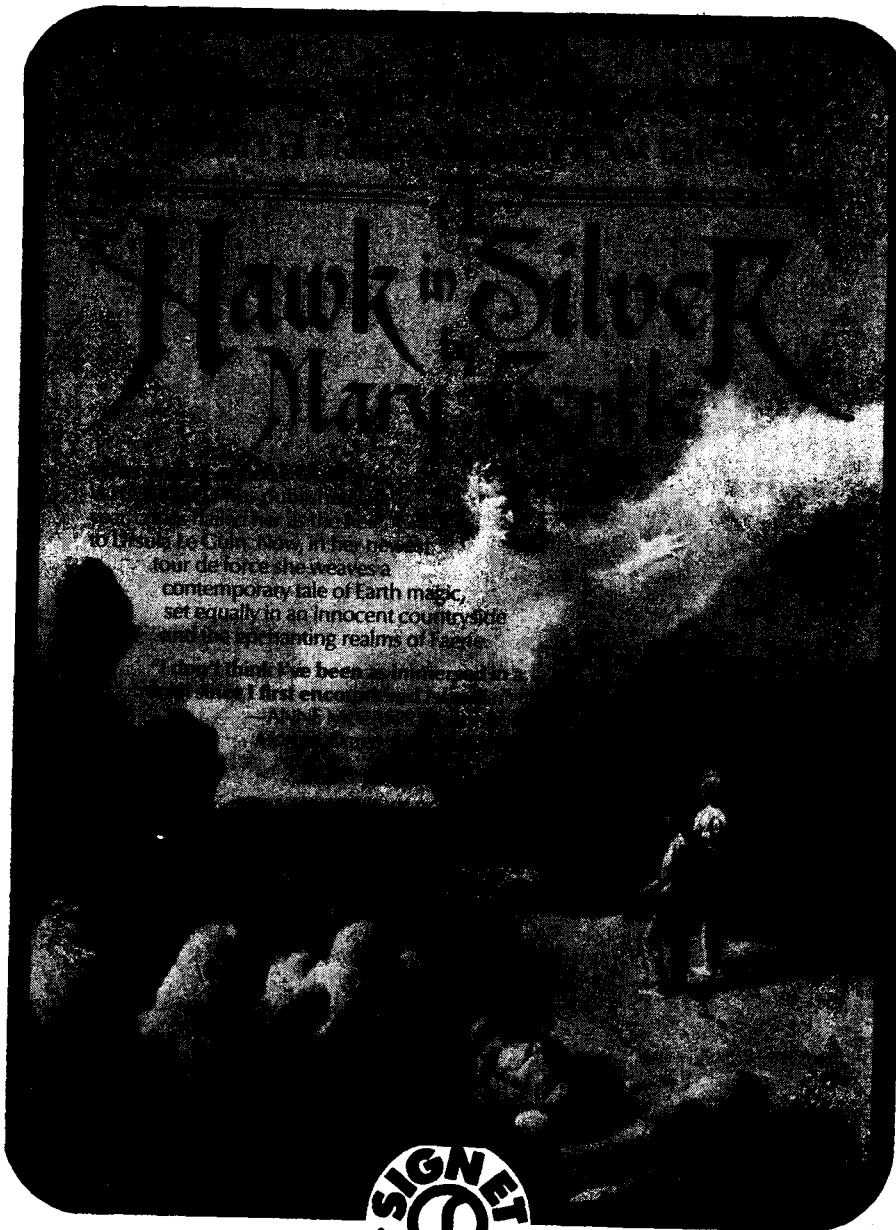

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not in command, apparently, the ship comes out okay—and you're *not* in command. QED."

She closed her eyes and seemed to slump into her mattress. "It's all right," she murmured.

I squeezed her hand and got to my feet. "Just thought you'd like to know. Got to get back to the bridge now, check our position. See you later."

I didn't wait for the rumor mill this time, but went ahead and broadcast the news on the crew intercom as soon as the sleepers wore off. I can't say that there was any great jubilation, but the easing of the general tension level was almost immediately evident. They stopped tiptoeing in Alana's presence and got a little of their usual vigor back, and within a day I'd even heard an offhanded reference to the shortest captaincy on record. I came down a bit on that one—it was still a traumatic experience from Alana's perspective, after all—but in general I was satisfied with the results of my surprise insight. Little things like that were what made a captain feel he was doing his job.

I got to bask in that self-generated glow for two days more . . . and then the whole thing started to unravel.

It was Pascal, predictably, who was first to tug on the thread. I was relieving him on the bridge, and he had given me the normal no-changes report, when suddenly his eyes took on an all-too-familiar faraway look. "Captain, I've been thinking about the *Angelwing*," he announced.

"Yes?" I said with quiet resignation.

"Yes, sir. I've been trying to think of an accident that could possibly occur that could kill the captain and no one else."

I suppressed the un-captainly urge to tell him to shut up. Pascal was famous for coming up with the most thoroughly bug-brained theories imaginable . . . and I *really* didn't want to hear anything more about the *Angelwing*. But if I could let Alana cry on my shoulder, I figured I could at least hear Pascal out. "We don't *know* no one else would have been killed," I reminded him, choosing my tenses carefully. It *had not happened*, after all. "Just that if Alana hadn't been in command *she* wouldn't have been killed."

He waved the distinction aside. "Regardless, sir, the point remains that liners are almost as obsessive about safety as they are about staying on schedule. In the three hundred or so years of commercial star travel there've been only six hundred single deaths aboard commercial carriers; and ninety-five percent of those have been due to personal health failings—coronaries, apoplexy; that sort of thing. Almost all of those were passengers, of course."

I nodded: liner companies keep their employees' health under embarrassingly tight scrutiny. "What about the other thirty-odd deaths?"

"Direct violence. Murder, in one degree or another."

I thought about the politics you get in any large company, and the fact we were still talking abstract might-have-beens didn't affect the shiver that went down my back. "Are you suggesting she would have been *murdered* if she'd been made captain?"

Pascal shrugged. "Possibly, but I don't think it was that. Statistically, it's

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much more likely that she would have died from one of the two multiple-death causes. Quite a few thousand have gone that way. Now—''

''Where'd you get all these figures, anyway?'' I interrupted. ''You're not wasting library space with this stuff, are you?''

He looked surprised. ''It's all from the *Worlds' Standard Deluxe* you bought for us last year.''

I ground my teeth. I'd picked up the encyclopedia originally as a tool for settling shipboard arguments. Obviously, I hadn't been thinking about Pascal at the time. ''All right, then, let's have the rest of it. What are these two multiple-death causes?''

''One is the complete destruction or disappearance of the ship,'' Pascal said. ''Usually disappearance, presumably from failure of the Colloton field generator during cascade maneuver. Seldom proved, of course.''

''Right.'' Whether a ship disappeared completely down some unknown galactic rabbit hole or spread itself over a few million kilometers of its path weren't results you could readily distinguish. ''And number two?''

''Large-scale accident. Engine room plasma explosion, flywheel breakup—things like that.''

I gnawed at the inside of my cheek. ''Neither of those ought to affect the captain,'' I pointed out, with more enthusiasm than I felt. The logical corner this conversation was directing us toward had a lot of unpleasant thoughts lurking in it. ''What sort of accident could affect a liner's bridge?''

Pascal sighed. ''I don't know, yet. That's the part I'm still working on.''

''Well, work on it down below,'' I grunted. ''And let's not spring this one on anyone else for a while.''

He shrugged. ''Yes, sir. If you insist.''

I forced my brain and fingers to go through my standard check-out routine after he left, confirming that the *Dancer* and her systems were functioning properly. But when that task was over there was little left to do but sit back, watch the displays and status boards, and think.

Mostly, I thought about Pascal's theory.

The figures themselves could be checked out easily enough, but I had no reason to doubt them. Pascal's research was usually good; it was in the conclusions that he usually clarnked up. So assuming his numbers, I was left with three possible cases.

Case One: a freak accident or sickness. I didn't really believe in the first and definitely didn't believe in the second. I watched my crewers' health as closely as the commercial lines did, and it was virtually impossible for a life-threatening condition to slip through a full examination without making at least a hint of its presence known. Alana was in far too good a shape simply to drop over dead. Regardless, my duty in response to Case One: no action. The *Angelwing* was proceeding on its way with its first officer in command, and we'd eventually learn the details.

Case Two: Colloton field failure. Maybe *only* if Alana had been captain, though that was also a hard scenario to set up. Case Two response: again, no action. If the *Angelwing*'s field had gone, it was far too late to do anything now.

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And Case Three: a major accident that had killed the captain and possibly crippled the ship. My response . . . ?

My response should be to turn tail, make hell-bent back for Baroja, and raise the alarm. With an early enough jump, the ship might be saved.

I ran through the logic five times, and got stuck at that same spot each time. Returning to Baroja would throw the *Dancer*'s own schedule completely out the lock, and the resulting flurry of penalty-clause claims could bring us flaming out of orbit for good. For the guarantee I'd save some lives it would probably be worth the risk. But without any such certainty . . . and here I found Case Four staring me in the face: an unexplained cascade point event and Pascal's fertile imagination teaming up to create a giant wad of nothing.

The more I thought about it, the more Case Four seemed the likeliest. To get information like Pascal was assuming out of the cascade images you had to assume that they were able to couple to the real universe *and* that they were able to respond to changes in the universe instantaneously *and* that Alana's captaincy was the only significant difference between us and that particular might-have-been. None of those assumptions sounded likely, let alone orthodox. If I bankrupted the *Dancer* and made a fool of myself for nothing, never forgiving myself would be the kindest of possible responses.

But if Case Three *was*, in fact, correct . . .

It took me an hour to conclude finally that there was no logical way out of the deadlock, and another half-hour to decide that, as matters stood, the evidence was too frothy to justify risking our financial integrity. At that point, it took a mere five minutes to decide it would be best if no one else even heard about the theory.

A good, rational decision, and one I probably could have lived with. Unfortunately, as it turned out, I made it nearly an hour too late.

I'd put the *Angelwing* out of my mind —with some difficulty, I'll admit— and was looking over the plots for our three upcoming cascade points when Alana came charging onto the bridge. "Pascal tells me the *Angelwing* may be crippled," she said without preamble. "What are we going to do?"

"Wring Pascal's neck, for starters," I growled. "I ordered him not to tell anyone."

"He didn't—well, not really," she said, coming to stand next to my chair. "I picked up on an under-the-breath comment he made and forced it out of him."

"Like forcing a star to give off light. He's worse than Sarojis when he locks onto something."

"I told him it would be all right, Pall—please don't make a legal action out of it. So now what are we going to do about the *Angelwing*?"

"What do you suggest?" I asked.

She seemed taken aback. "That we head to the nearest port and get a patrol rescue squad out there, of course."

"And what do we tell them when they ask how we know the ship's in trouble?"

"We tell them—" She broke off, suddenly recognizing the problem. "Well, we tell them the truth, I guess."

"You think they'll listen?"

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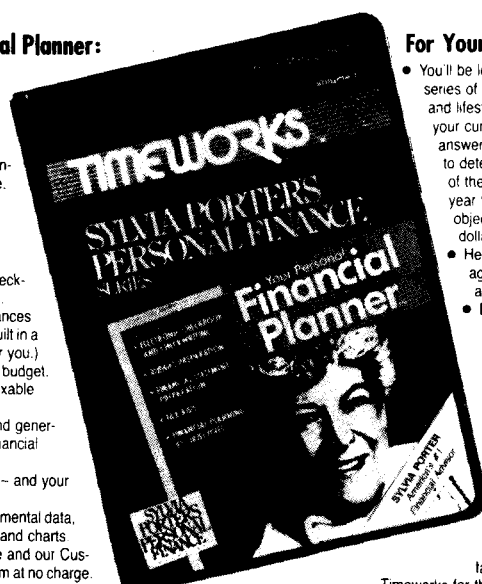

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From America's #1 Financial Adviser

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Her uncertainties began to edge into anger. "Pall, what's the matter with you? There may be people out there who'll *die* if they don't get help right away."

"*Or* who may *not* die; or who may not be out there at all. And before you get mad, just listen to me a minute."

I gave her a condensed version of the mental gymnastics I'd gone through earlier. Somehow, the arguments didn't sound nearly as persuasive when listed aloud. Not to me, and certainly not to her. "And what if you're wrong?" she asked quietly when I'd finished. "You could be, you know. Maybe this is a perfectly normal aspect of the Colloton Drive that's just never been noticed before."

"And what if it was really just wishful thinking?"

That was *not* what I had meant to say, or at least not the way I'd meant to say it. But all the good intentions in the universe couldn't soften the shock that appeared on Alana's face like a handprint after a slap. "Pall . . . you think I *want* the *Anglewing* to die?"

"No, of course not," I told her, wishing I could bite off my tongue. "I just meant that maybe as a—oh, I don't know; a justification, I suppose—that maybe to justify giving up your position there your subconscious might have . . . done some editing."

Her smile had an edge of permafrost to it. "*You're* the one who's always had problems with cascade images, not me. If the mind could edit them out at will, don't you think yours would have done so long ago?" She didn't wait for an answer, but headed back to the door. "If proof is what you're looking for, then that's damn well what you're going to get," she said over her shoulder.

"Alana—" I called. But too late; she was already out the door. For a long minute I stared at the displays, swearing whole-heartedly under my breath. Suddenly, with a few badly arranged words, I'd changed the whole character of this issue. No longer was it simply a theoretical question of whether there was a ship in danger out there; now it'd become a test of Alana's psychological health and my trust in her.

And that meant the option of simply dropping the whole thing was no longer available. I'd seen Alana in this kind of mood before, and she wouldn't rest until she'd dug up some proof, real or otherwise, to show both of us that she wasn't imagining things. As a strongly empathic and emotionally-oriented person, she apparently needed to prove occasionally that her brain worked as well as anyone else's.

Which very likely meant that whatever she came up with, I was going to have to pretend to believe her.

I swore again and punched up a list of our current cargo contracts, keying for the penalty clause sections. It was as bad as I'd expected it to be—if we hit Earth that late the *Dancer* would be years paying off the penalties. Assuming our creditors let us fly again at all.

I was about a third through when I hit the first anomaly, and by that time my mood had deteriorated so far that I did what I would normally have found impossible to do: I called Wilkinson up on the crew intercom and actually yelled at him.

Good old solid unflappable Wilkinson, he just sat there quietly and ab-

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sorbed it for the two minutes it took me to run down, never so much as raising his voice in protest. I wished afterwards that he had; I might have felt less like a fool if he'd cut me off sooner. "There's nothing missing from that contract, Cap'n," he said calmly when I finally gave him a chance to respond. "That's exactly how it came aboard."

"That's ridiculous," I snorted. "No penalty clause, no secondary routing or credit arrangements—this thing looks like it was thrown together over someone's lunch hour."

"Yeah, I noticed that," Wilkinson nodded. "All the crates from our two first-timer clients are the same way."

"You're kidding." I hadn't reached the others yet, but now I called up their listings, to find that Wilkinson had actually understated the case a bit. Not only were all the contracts deficient, they were deficient in exactly the same areas. "Are you *sure* you were really dealing with people from these companies?" I asked. "Harmax Industries practically invented Baroja's electronics business—you can't tell me they don't know how to write a shipping contract."

"The papers had the proper letterheads and ID grain. And the fund transfers were done properly."

"But you didn't run a full confirmation check?"

"Didn't think it was necessary, with the shipping fee already in our account. Besides, with the deals cut as late as they were I probably wouldn't have been able to get a check through the hierarchy and back in time."

I remembered now Wilkinson's telling me our cargo space had finally been filled, barely two days before our scheduled lift. What I *hadn't* realized— "All *four* of those big crates were contracted the same day?"

"Plus one small one that's in the Ming-metal shield. That one's Harmax, too."

With, I quickly discovered, the same amateur contract . . . and by now my anger and frustration had given way to another emotion entirely. A cold, unpleasant one . . . "You, uh—you have any idea what's inside any of them?" I asked carefully.

"Industrial equipment, the manifest says."

Which told us exactly nothing. As it was probably meant to.

And suddenly I began to feel nervous. Nervous enough to try something both unethical and highly illegal. "Wilkinson," I said slowly, "do you think you could get those crates opened enough for us to take a look inside? And then seal them again undetectably?"

"Well . . . I could open them, sure. But closing them up, probably not."

"It doesn't matter that much. Meet me in the number three hold right away, with whatever tools you'll need."

"Yes, sir," he said. Breaking the connection, I gave the status boards one last check and headed out the door, trying not to show the anxiety I felt. Pascal hadn't been able to come up with any reasonable accident on the bridge that could result in the captain's death, and in my own hours of thinking about it I hadn't found any possibilities, either. But there *was* one scenerio that could easily explain it.

Sabotage.

We opened the first of the huge crates

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as carefully as if it were loaded with loose eggs . . . and to my great relief found nothing resembling a bomb inside. What we *did* find was far more unlikely.

"What the *hell?*" I growled as we peered down through the plastic slatting Wilkinson had opened. "What's Harmax doing shipping space yachts around?"

"It's just the nose, Cap'n," Wilkinson pointed out, playing his light around the back of the vaguely conical shape. "Maybe 'bout—oh, 'bout a third of a ship."

"A third?" There were *four* crates, plus the one inside the shield . . . and my stomach was starting to churn again. "Let's take a look inside the others."

He turned out to be correct. Two of the other crates contained the mid and aft sections of the yacht, with what looked to me like a complete quick-connect system at the edges. The fourth crate contained an impressive set of tools, including welding equipment and several SkyHook gravetic hoists.

It also contained a small, flat flywheel.

The implications of the latter were clear, but neither Wilkinson nor I really believed it. We had to open the box in the Ming-metal shield to confirm that it did, indeed, contain two Aker-Ming Autotorques before either of us would admit out loud that we had a miniature star ship aboard the *Dancer*.

"It's crazy," Wilkinson grunted as we set about resealing the crates. "No one builds ships that size for interstellar travel. Costs too much to put a Colloton Drive aboard, for starters."

"Could it be a new design lifeboat?" I suggested. "You could probably squeeze ten or twelve people aboard the thing if you really worked at it. Lord knows the passenger lines have been begging for a Colloton-equipped lifeboat long enough."

"And they'll continue to beg for one," he said. "Matope could tell you why you get the size constraints you do, but I know this much." He rapped the plastic we were working on with his hammer for emphasis. "This little boat here probably cost as much as a top-of-the-line passenger ship."

I glared down at the plastic, trying to make sense of it. "Could it be a new, cheaper design Harmax is sending to Earth as a demonstrator model? For contract bids?"

"Why send a whole boat?" Wilkinson countered. "The specs or computer trials would be adequate. Besides—sent it with *us?*"

I sighed and gave up. "Okay, so there *isn't* a logical explanation. We'll write Harmax a letter when we get to Earth and ask them about it."

Wilkinson cleared his throat. "Speaking of unexplained phenomena . . . I understand we may be diverting back to Baroja soon."

I clenched my jaw momentarily. "I get one guess as to where *that* idea came from?"

"She talked to me for a couple of minutes about the *Angelwing* maybe being in trouble, just before you called with your questions about these shipments," Wilkinson said, looking as close to embarrassed as I'd ever seen him. "And since *you* were asking about penalty clauses, I assumed you'd decided she was right."

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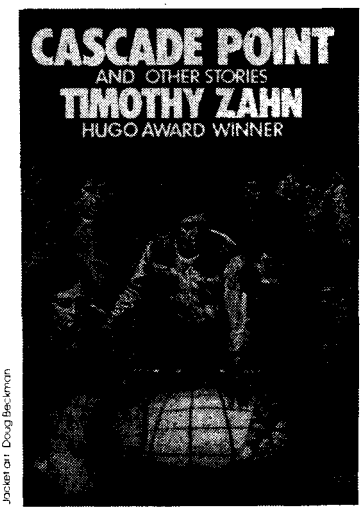

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"What do *you* think?" I asked him.

He shrugged. "I never was good at that kind of decision, Cap'n. Maybe you should ask one of the others if you want advice. They've probably heard about it by now."

Sometimes I wondered why I ever bothered with the crew intercom. "Thanks, but a vote won't be necessary. If you'll finish up here, I need to get back to the bridge."

I started the computer calculating the run back to Baroja and then used the main intercom to set up a meeting with the passengers in half an hour. I expected Alana would check in with me before then, and I was right.

"We're going back?" she asked quietly, again coming over to stand beside my chair instead of sitting down.

"Yeah," I told her, keeping my voice as matter-of-fact as possible. "It looks like we might possibly be carrying some stolen property aboard, and I think it's worth looking into." I explained about the sectioned yacht and the oddly deficient papers on it. "Whether it's some rich man's toy or a breakthrough prototype, it doesn't belong on a tramp starmer," I concluded.

"Unless there's some perfectly reasonable possibility we've overlooked," she said. "Though . . . I suppose it still gives you a good enough excuse to go back."

Her unspoken sentence hung heavy in the air for a moment, and eventually I gave in and answered it. "It's not that I doubt your belief in what you saw," I told her. "It's just that . . . I don't want to look like a fool, Alana. And I especially don't want to lose my ship while looking like a fool."

"I understand. Dignity is very important to you." She touched my shoulder gently. "Thanks for . . . indulging me on this. What can I do to help?"

I glanced at my watch. "You can start by remembering everything you can about the *Angelwing*—her routines, her facilities, her crew, and especially everything you know about Lenn Grandy. We're going to have to present the patrol rescue squad with a plausible accident scenario if we want to get them moving."

"I haven't been thinking about much else lately," she said dryly. "When do you want to listen?"

"In about fifteen minutes," I said, unstrapping and getting to my feet. "I've got to go to the lounge and give the passengers the exciting news. I'm sure they'll be just thrilled."

Stunned would have been a closer prediction. Stunned, followed by worried and angry in about equal proportions. For no particular reason I skipped the whole thing about the yacht in our hold, giving them instead the ship-in-danger reason for our course change. Fortunately, I suppose, no one seemed to know enough about interstellar communication to ask embarrassing questions about how we knew the *Angelwing* was in trouble, though I *was* kept busy answering more mundane questions of scheduling, delays, fuel and provision reserves, and so forth. The whole thing took nearly twice the fifteen minutes I'd promised Alana, and it was with a wet-noodle kind of relief that I finally bid them good day and escaped from the lounge.

Or almost escaped. I'd made it barely ten meters down the hallway when Or-

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landis caught up. "A word with you, Captain?" he said, falling into step beside me.

I kept walking. "If it's brief. There's a lot of work to be done in rerouting the ship."

"I understand. Tell me, do you really believe this *Angelwing* is in trouble?"

"I wouldn't be disrupting all of our lives like this if I didn't," I told him shortly. It was a pretty stupid question.

"Um. Captain . . . I need to get to Earth as soon as possible. It's why I chose the *Aura Dancer*, in fact; you were the most direct carrier. It seems to me that we're very near the midpoint of our trip right now—is that correct?"

"More or less. In time, at least, which I presume is what you care about."

"Yes. All right, then, why can't we simply continue on to Earth and alert the patrol there?"

"That should be obvious." *Even to you,* I added silently. "The *Angelwing* will be within a very few light-years of Baroja. Getting the message from Earth back to Baroja would add a minimum of three more weeks to the two it'll take us to get things going anyway."

We took a couple more steps in silence, and then Orlandis cleared his throat. "I understand liners are legally required to keep a three months' emergency-ration supply of food on hand. Three extra weeks shouldn't be fatal to them . . . and I *could* make it worth your while to continue on to Earth."

I snorted. "I doubt that very much, Mr. Orlandis."

"No? The *Aura Dancer* is currently running several sizeable debts—"

He overshot a step as I abruptly stopped and turned smoothly to face him. "How the hell do you have access to the *Dancer*'s finances?" I snarled. "That's legally privileged information—"

"Except to the companies handling those finances," he put in calmly.

The rest of my speech evaporated. "And which one do you work for?"

"I don't *work* for any of them," he said with a faint tinge of disdain. "But I have extensive financial interests in various companies and institutions, including four to whom you owe money. Shall I quote you names and account numbers?"

"Uh . . . yeah, why not."

He proceeded to do so, and I felt the universe tilt gently around me. Even getting such information *ille*gally required a lot of money, and it slowly dawned on me that I was facing a man who could probably buy Cunard Lines a new *Angelwing* if he wanted to without unduly straining his resources. "And you're offering to cancel my debts if we get you to Earth right away?" I asked him carefully.

He smiled. "When you're talking potential millions, a few thousands to get you out of debt aren't really significant. Yes, I'm offering that . . . and perhaps some extra compensation besides."

Out of debt. The words echoed through my brain. To be finally out of our slowly deepening hole . . .

Which would be of no comfort at all to the *Angelwing*'s dead. Or to Alana.

I took a deep breath. "I can't morally justify those extra three weeks of delay," I told Orlandis. "But maybe we

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can compromise. Have you ever heard of Shlomo Pass?"

He frowned slightly. "I don't think so."

"Well, it's sort of an in-joke among star ship pilots. It's just a section of space between Earth and Cetiki that happens to be very 'smooth'—that is, easy to calculate cascade maneuvers from. A lot of ships use it, and not only for that particular run.

"Now, it'll take us three cascade maneuvers to get back to Baroja anyway, and we can probably make the first of those to Shlomo Pass. Getting in position for the next one would take a couple of days; and *if* during that time we get within communication distance of a ship bound for Baroja, I can have *them* report on the *Angelwing* while we turn around and make for Earth. You'd lose—oh, a maximum of five days, probably closer to three. Would that be enough to salvage whatever deal you need to get back for?"

Orlandis pursed his lips and then nodded. "Yes, I believe it would. And if you *don't* find such a ship—?"

"We continue to Baroja."

His eyes searched my face, and I had the sudden, uncomfortable feeling of being a side of beef up for appraisal. But if he'd been planning to raise his offer, he apparently changed his mind. "Very well. I certainly understand your position. Let's both hope you find a cooperative ship. Good day."

He nodded and stopped past me, heading back toward the passenger areas. I continued on toward the bridge, resisting the urge to turn and watch him go. Whether he realized it or not, in five minutes of conversation the man had just about doubled the confusion level surrounding this whole affair. The confusion and, with his bribe offer, the pressure I was feeling. Grumbling under my breath, I tried not to stomp and wished I'd followed my original coward's inclination to let Alana or Tobbar give the passengers the news.

And yet . . .

I've been told more than once that I work best under pressure. Work *and* think. And it was as I was climbing the circular stair to the command deck that the first pieces finally started falling tentatively together. . . .

Alana was still waiting when I reached the bridge. "I was wondering if you'd gotten lost," she greeted me, searching my face unobtrusively as if for fresh traumatic scars. "Someone make a fuss?"

"It was actually more of an offer." I gave her a sketch of Orlandis's proposal and my counter to it, watching the emotions shift across her eyes as I did so.

"And what are you going to do when Shlomo Pass turns out to be empty?" she asked when I'd finished.

"Pessimist."

"Realist. I know Shlomo as well as you do—it isn't exactly the grand switching station you make it sound like."

"In that case we go back to Baroja ourselves," I growled. "How many times today am I going to have to say that?"

"Sorry." She shook her head. "Sorry for everything, Pall—this whole mess is my fault."

"Let's worry about assigning blame after the fallout's decayed about a half-

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life, okay? For now let's concentrate on the *Angelwing*."

"Yeah." She took a deep breath. "Where do you want me to begin?"

The intercom beeped before I could answer: Kate Epstein, down in the passenger section. "Captain, do you know were Alana is?"

"I'm right here, Kate," Alana spoke up. "It's Mr. Orlandis, right?"

"Yes. He says you'd promised him a chess rematch this afternoon."

"I know; I'd completely forgotten. Listen, would you make apologies for me, and—"

"No, go ahead," I interrupted her. "This talk isn't all *that* urgent—we're a solid day away from even the first cascade point back."

"But—"

"No buts about it," I said firmly. Another piece of the puzzle had clicked into place—maybe—and suddenly it was highly desirable to have Alana and Orlandis off in a quiet corner. Away from the rest of us. "Look, tell you what I'll do: I'll stay here with you through the first part of your shift and we can talk about the *Angelwing* then. Fair enough?"

She hesitated a second, as if seeing there was something hidden behind my words. But then she nodded. "All right. That's . . . uh . . . about two hours. If I can beat Orlandis fast enough I'll be here sooner."

"Fine. Have fun."

I watched her leave, and gave her enough time to meet Orlandis and get into their game. Then I got on the crew intercom. It took a few minutes, but eventually I had the seven other crewers tied into the circuit with me. "I suppose you've heard rumors by now about a course change back to Baroja," I told them. "I want to open the floor to discussion . . . but before I do, one *very* important question." I took a deep breath. "After Alana saw her cascade image captain disappear, I asked you all to keep what had happened away from the passengers. If one of you let it slip anyway, I need to know that. I have no interest in placing blame or in punishment, but that information is *vital* to what we do next. Understand? All right, then: anyone?"

My crewers have their fair share of problems, but I'll give them this much: every last one of them is unflinchingly honest. And one by one, they thought it through and declared themselves innocent of even discussing it within passenger earshot.

I turned them to the Baroja issue then, and for awhile the pros and cons, facts and figures flew back and forth freely. But I didn't really hear most of it. My mind was on another subject entirely . . . one that was slowly beginning to twist my guts.

Orlandis had accosted me three days after the event with clear knowledge of Alana's cascade point vision. But he *hadn't* found out about it from anyone aboard. Was he telepathic? Hardly. A good guesser and judge of body language? That could have given him only a reading on the crewers' tension level, not any of the details.

Then had he somehow known the *Angelwing* was headed for disaster?

Sabotage. The word repeated itself over and over in my head. A man who could *buy* a ship if he needed to get to Earth in a hurry, and yet he'd chosen

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instead to travel on the *Dancer*. Whose first officer just *happened* to have once been an officer on the *Angelwing*.

Had he known what would happen to Alana's cascade pattern? Known, or guessed, or intuited? And if he had, what did confirmation of the *Angelwing*'s disaster gain him?

I couldn't imagine. But I knew it was necessary for him to go to Earth to make it worth his while. He'd as much as admitted that when he risked exposing himself as wealthy enough to make his bribe offer believable.

Wealthy enough to afford the pocket star ship down in our hold?

Perhaps . . . and that thought sent a fresh shiver down my back. If that *was* Orlandis's, then he didn't actually *need* the *Dancer* to get where he needed to go.

Abruptly, I realized conversation had ceased. "Any other comments?" I asked. "All right, then. Again, this issue is *not* to be discussed with the passengers. You get any questions or complaints, you buck them to me. Understood?"

They assured me they did, and we broke the multiple connection. I went back to thinking; and when Alana arrived ninety minutes later I was still at it. "You beat him?" I asked as she settled into her seat.

"Uh-huh. Shall we get started?"

"Whenever you're ready."

"Okay. Let's start with Lenn Grandy. He's a lot like me in many ways—an old-fashioned type who doesn't really trust wizard gadgetry like the Aker-Ming Autotorque . . ."

She talked nonstop for over an hour, and I listened in silence the entire time. More than once I considered telling her my suspicions about Orlandis, but each time I fought down the urge. Alana was smart and capable . . . but she was also a mender of bruised souls, a woman who empathized with and cared for people. What would her reaction be to finding out she'd been associating with a possible murderer?

I couldn't risk it. For once, I was on my own.

Shlomo Pass was, from a theoretical viewpoint, a fascinating anomaly in the sky; and, from a practical viewpoint, a boon for calculation-weary travelers. For nearly a quarter light-year in any direction the magnetic, gravitational, and ion vector fields were extremely flat, which meant you could calculate a cascade maneuver several hours ahead of time without worrying too much about fluctuation errors sending you to hell and gone off your intended target point. There also wasn't a single sizeable body for five light-years to clarnk you up, and on top of that it was a convenient spot for at least fifteen interstellar runs. All in all, if there was any spot in deep space you were halfway likely to run into another ship, Shlomo was it.

Unless, apparently, you were the *Aura Dancer*.

We spent two days traversing a section of the Pass, and never once picked up signs of anyone else.

"I've got the calculations for the next point," Pascal announced as I came onto the bridge on that final day. "That is, if you still want to head out in three hours."

I nodded and took the printout in silence. A full sixteen light-years back

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toward Baroja—Pascal had taken good advantage of Shlomo's benevolence. "Looks fine," I said. "Okay, I'll take over now."

"Yes, sir. Uh . . . Captain? I've been thinking some more about the *Angelwing*. I think I may have an idea of what could have happened."

Think, may, could. With qualifiers like that, this one ought to be a real gem. "Let's hear it," I grunted.

He waved his hand in the general direction of the Colloton field switch. "Even with an Aker-Ming actually doing the work, a liner's supposed to have an officer on the bridge during cascade maneuvers. Right?"

"Right. He's usually in light sleep state, but he *is* there."

"Okay, then. Suppose the Colloton generator somehow created an electrical feedback along the control cable to the bridge—shorted out, maybe, and sent line current along the wires as it was shutting down. An Aker-Ming couldn't take that—it'd likely vaporize its global lattice and explode."

And sitting right next to it would have been the sleeping captain? "Have you talked to Sarojis about this?" I asked. "Checked to see whether that can happen?"

"Well . . . *he* says it isn't possible to get line current to the control cable," Pascal admitted. "But who knows about freak accidents like that? And he *did* say an Aker-Ming *will* explode if you put that much power to it."

"Um. Okay, well, you head below and work out the details. If you come up with a plausible feedback mechanism we'll talk some more about it."

"Sure. See you later, Captain."

I settled down into my seat and ran through the check-out routine . . . but even as my fingers kept themselves busy, my eyes kept straying to the Colloton field switch. In some ways Pascal was a curiously naive man; he could theorize an incredible tangle of assumptions about the universe at large while missing entirely the factor of simple, human evil.

You didn't need line current across the Aker-Ming Autotorque when a bomb would work equally well.

I reached over to the crew intercom, keyed for the engine room where Tobbar had just come on duty. "Everything normal back there?" I asked when he answered.

"Yes, sir. No problems at all."

"Good. Tobbar, you once told me that Orlandis didn't belong on the *Dancer*. Why not?"

"He's too rich and important," was the prompt reply. "Probably rich enough to own his own ship; at least rich enough to charter a decent one."

"But how do you *know*?"

"Because he talks too slowly."

I blinked. "Say again?"

"He talks too slowly. You see, Captain, when you're important enough you don't *have* to talk fast—people will take whatever time's necessary to hear you out. It's those of us at the *bottom* of the social heap who have to get our thoughts out quickly before everyone walks away."

I thought back over the few brief conversations I'd had with Orlandis, and damned if Tobbar wasn't right. Precise, carefully measured speech—and a very clear sense that you *would* stand patiently by until he'd finished. "Any

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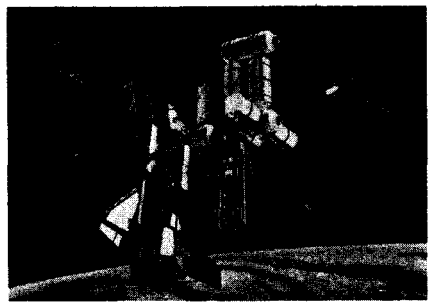

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chance he could be faking it?'' I asked Tobbar.

He shrugged. ''I doubt it. If he were trying to pass himself off as the original nabob of borscht he should have put some more money into his clothes and jewelry. If he were smart enough to change his speech pattern, he should have been smart enough to think of obvious details like that.''

I gritted my teeth. ''Yeah. Okay, thanks. We'll be doing our next point in about three hours, so you can start securing things whenever you're ready.''

''Yes, sir.''

I broke the connection and scowled at the Colloton field switch for a few minutes. Okay: so Orlandis *was* rich. And the yacht in our hold was certainly expensive; it was hard to avoid the inference that the two went together. So let's see: Orlandis had sabotaged the *Angelwing* by unknown means and for unknown purpose, then signed aboard the *Dancer* in hopes of getting confirmation of his success. A sudden thought occurred to me, and I called up the passenger manifest. Yes: Orlandis had booked passage four days after our arrival on Baroja; two days after Alana's first get-together with her old *Angelwing* friends. With a good enough information network, then, he would have had enough time to hear about her cascade point ''captaincy'' and make his plans.

So far, so good . . . except that none of that yet explained the yacht. Unless Orlandis didn't want word of the *Angelwing*'s distress getting out until it was too late. Which meant eliminating the *Dancer*.

Steady, Durriken, steady, I told myself as a lump rose to about the middle of my windpipe. *Think it out.*

Would getting rid of us really do the trick? If *we* didn't raise the alarm the first hint of trouble would be when the *Angelwing* failed to show up at Lorraine. Twenty-eight days after her departure from Baroja; nearly that since her accident. I hadn't been joking earlier about Cunard's clock-watching reputation: on a given run their ships always took the exact same number of cascade points, each of an exactly specified length, with the real-space intervals between them equally well defined. Given that, the Lorraine office probably wouldn't let the ship be more than two or three days overdue before sounding the alarm . . . and when they did, they would have only those four precisely demarcated real-space areas to search.

Except that from the timing of Alana's cascade point event we knew that the disaster had occurred on one end or the other of the *Angelwing*'s first maneuver . . . which meant it was either a few hours out from Baroja—and presumably already rescued—or else nine point two light-years out toward Lorraine. To reach *that* spot, the Lorraine searchers would require another three weeks. Total time: less than eight weeks. Easily within the three months the *Angelwing* should be able to survive.

I shook my head, trying to clear it. The more I tried to track through the logic, the more confused I became and the more the loose ends threatened to grow up my sleeves. If Orlandis was trying to destroy the *Angelwing*, he was doing a lousy job of it. If he *wasn't*, then none of this made any sense at all.

Unless the accident itself was what

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he needed, fatalities or lack of them being irrelevant. The accident, and getting quickly to Earth. Well, if *that* was what it took to make him feel happy, then I was perfectly happy to oblige. Keying the main intercom to general broadcast, I flipped it on. "Good morning, everyone, this is Captain Durriken," I said into the mike. "In just under three hours Dr. Epstein will be administering your sleepers for the *Aura Dancer*'s next cascade maneuver. You will be pleased to know that we've changed course once again and *will* be continuing on to Earth as scheduled. A few minutes ago I was able to contact another ship bound for Baroja, and so the rescue mission I told you about will be handled without any need for us to go back. Thank you for your patience, and I'm glad things have worked out this way. Enjoy your day; Captain out."

I switched off the intercom and picked up the printout Pascal had left me. If Orlandis wanted to play games, fine. I could play games, too. Maybe sometime in the next few days I'd figure out what exactly was going on here. Preferably before we actually arrived at Baroja.

Death and taxes are still the only two items universally acknowledged as inevitable; but on my own personal list a post-cascade visit from Orlandis was running a pretty close third. Correctly, as it turned out; and as I came down the spiral stair to the passenger deck at the end of my shift I found him waiting. At least this time he'd had the grace to stay where he belonged.

"I just wanted to thank you for your assistance and cooperation, Captain," he said as I stepped around the stairway railing. "And I wanted also to assure you that my end of the arrangement will be carried out as soon as we reach Earth."

"Thank you, Mr. Orlandis," I said gravely. "I hope your own business deal will be successful."

"It should be," he nodded. "In fact, if you could allow me access to the ship's communication equipment once we're within range, I could practically guarantee it."

"Well . . . we'll see, but it should be all right. I don't suppose this deal is anything I could get in on?"

His smile wasn't *quite* condescending, but it was pretty damn close. "I'm afraid not, Captain. Not unless you have a hundred million in investment capital available to you. Tell me, what do you think happened to the *Angelwing*?"

The abrupt change in subject threw me off guard. "The—uh—what do you mean?" I stammered at last.

"You know—the accident you believe happened to it. What do you think went wrong?"

My mind went blank. With my suspicions about Orlandis, I'd been fighting to avoid even *thinking* about the *Angelwing* in his presence, lest he pick up something odd in my attitude. To have him ask such a point-blank question was the last thing I'd expected . . . and with no plausible story prepared I had only one recourse. "Well, I'm not sure. But my computer expert thnks it may have been a field generator feedback . . ."

I spun out Pascal's whole theory for him, working hard to make it sound plausible. I must have succeeded, be-

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cause when I finished he nodded. "I see. Interesting. Would a blast of that sort actually be enough to disable a ship that big?"

I shrugged. "The exploding Autotorque, probably not. But remember that the field generator would also have been ruined, and if the damage was extensive enough it might be beyond repair."

"Leaving the ship helpless somewhere out in deep space," he nodded.

"Exactly nine point two light-years out, if they were on Cunard Lines' standard Baroja/Lorraine run," I said, obscurely glad I could quote him the exact number. "And of course they would have blown out a cloud of high-speed distress buoys as soon as they knew they were in trouble, so the rescue ships won't have to get closer than maybe five light-hours to find them."

"Sounds like you've worked all of this through quite well," Orlandis said. "I trust the patrol rescue squads will be equally astute. How long now before we land?"

"Uh—" I tried to remember how long it usually took from Shlomo Pass to Earth. "Should take three more cascade maneuvers, unless conditions have changed drastically in the past year or so. Which it may have—the Barnard's Star system can be a pain. Say, ten or eleven more days."

"I see. Thank you, Captain; I'll let you get on with your business now."

"Thank you," I said automatically as he turned and walked away. Scowling to myself, I headed the other way and escaped to the solitude of my cabin. There I threw myself down on my bed and roundly cursed Orlandis and the power he had to make me feel like one of his menials. For a long moment I seriously considered going to the man and telling him that *we* were headed for Baroja, and that if *he* wanted to go to Earth he could jolly well put together his fancy yacht, load his two Autotorques aboard, and leave.

Two Autotorques?

I stared at the ceiling for a long, chilling moment. Then I got back up and left, forcing myself not to run.

Matope was lounging in front of the main engine room status board when I got there a few minutes later with the canvas duffel bag I'd brought up from One Hold. "Everything under control and quiet, Captain," he reported, eying the bag.

"Good," I told him, "because I've got work for you. Come here."

He followed me back to the work table; and even with my peripheral vision I clearly saw his mouth fall open as I carefully withdrew the first of the two Aker-Ming Autotorques. "Captain! Where'd *that* come from?"

"Same place this one did," I said as calmly as I could. "A box marked Harmax Industries in our Ming-metal shield."

He looked at me with the kind of expression he usually reserved for sudden, unexpected problems with the *Dancer*'s engines. "Captain—"

"I want you to take them apart," I interrupted him brusquely. "I think one of them might be rigged to destroy a Colloton generator."

He stared at me for a long minute, gradually getting his face back together. Then, without a word, he picked up the two Autotorques and carried them over

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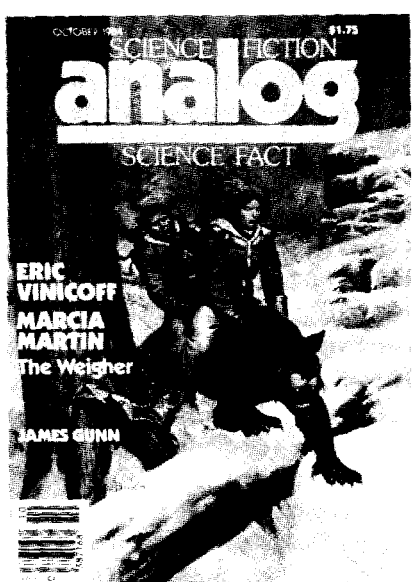

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to the scale. One, it turned out, weighed nearly a hundred grams more than the other. Taking the heavier one back to the bench, he spread out his tools and got to work.

I'd never seen the inside of an Autotorque before, and it was only as Matope slowly moved down the table, leaving a neat line of components and fasteners in his path, that I began to understand exactly why the things were so damned expensive. About halfway into the disassembly it suddenly occurred to me that we would probably have to take *both* Autotorques apart in order to find out why the first was heavier, because whatever the extra component was it could probably crawl out and bite either of us without our recognizing it as spurious. The thought added one more twist to the wringer around my stomach: we were in plenty of trouble right now without having two Autotorques belonging to someone else that we couldn't put back together again.

But that worry, at least, turned out to be unnecessary. Five minutes later, Matope carefully slid out the delicate global lattice and there, wedged in where it obviously didn't belong, was our culprit: a tiny mechanical timer and a heavy-duty sodium-bromine battery with attached capacitor.

"Well?" I asked after Matope had spent a few minutes poking around the battery and its environs. "What does it do?"

He fingered his screwdriver thoughtfully. "Hard to say exactly, Captain, but it looks like it's supposed to feed extra current into the lattice. Contact points here and here—see?"

I thought about Pascal's theory. "Which would vaporize it and make it explode?"

He gave me an odd look. "I doubt it. Even with the capacitor the power surge should warp or melt the lattice instead of flash-vaporizing it. Even at mid-maneuver, when the lattice is already as hot as it ever normally gets."

My eyes drifted to the timer. "Mid-maneuver. And what happens if the lattice melts?"

He ran some numbers on his calculator. "Hard to say. If the voltage peak is strong enough, it could discharge across the safeties into the Colloton generator control cable here. No, wait a minute—there must surely be a surge protector to ground out dangerous pulses like that."

"Show me."

He poked around for another half hour before finally giving up. If there'd ever been a surge ground line, it wasn't there now. And at that point there didn't seem to be any conclusion available except the one I'd already come to: this Autotorque had been designed to kill its ship.

"If the control circuitry gets hit with that kind of voltage spike, you'll probably lose at least a couple of the major coils before it can be drained off to ground," Matope explained. His voice was as calm and dry as always, but the hand gripping his screwdriver showed white knuckles. "There's a feedback line that would kick in the emergency braking system for the flywheel, though, and even with the generator ruined there's enough hysteresis to hold the ship in Colloton space for at least a few seconds."

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"Long enough for the ship to stop?"

He hesitated, then shook his head. "Not if the flywheel and ship were already rotating at top speed. A liner just has too much inertia to stop that fast."

And an instant later, both it and the device that had killed it would be disassociated atoms. I thought about that for a long minute, until I suddenly realized Matope was looking at me with an air of expectation. "All right," I said slowly. "Let's take the batteries and timer out and put the rest back together."

"And after that?"

"I'll put them back in their box in the shield and . . . figure out then what to do."

It took longer to reassemble the Autotorque than it had taken to pull it apart, and I was feeling extremely nervous by the time I headed back to the hold. But my temporary theft had apparently gone unnoticed, and within a few minutes everything was back to normal. Five minutes after that, I was flat on my back on my bed, staring at the cabin ceiling and wondering what the hell I *was* going to do.

Because suddenly the whole game had changed. Again. It'd started out as a freak event, moved on to become a logical puzzle, and then to a question of financial risk versus Good Samaritanship and the need to back Alana up in her fears about the *Angelwing*. But now the stakes had abruptly gone up . . . because there was only one reason I could think of for that gimmicked Autotorque to be aboard.

Orlandis was planning the same fate for the *Dancer* as he'd planned for the *Angelwing*.

And I was out of my depth. Completely. Logical problems I could tackle; equipment problems I could turn Matope and Tobbar loose on . . . but this was a situation of human invention, and I didn't have a handle on any of it. What did Orlandis ultimately hope to gain, for starters? Had the *Dancer* been doomed from the start, or was that decision still open?—and if so, what action of mine was likely to push it the wrong way? Orlandis thought we were going to Earth . . . or had he seen through my simple stratagem? And if I couldn't figure out the answers to any of those, how could I possibly save all of our lives?

Alana. I needed Alana—needed her insight, her knowledge of people, her sensitivity—

Her sensitivity.

Slowly, I withdrew the hand that had been reaching for the intercom. Through design or accident, Orlandis had continued to spend a fair amount of time with her even after he'd gotten his confirmation of the *Angelwing* disaster. I didn't know how Alana was starting to view him, but even if she were merely being friendly as part of a crewer's normal duty toward the passengers I still couldn't risk it. What learning the truth would do to her . . .

"All right, damn it," I snarled abruptly at the ceiling. "I'll figure it all out by myself."

And for starters, I'd figure out what exactly—*exactly*—had happened to the *Angelwing*. Because if she'd been fitted with a doomsday Autotorque like the one in our hold, it was clear the thing had failed in its task. *Only* the captain in Alana's cascade pattern had died,

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which meant the *Angelwing hadn't* disintegrated. So . . . why?

The timer had malfunctioned. If the generator had been fried too soon or too late, the ship could have possibly stopped rotating in time. Which would have left it disabled near one end or the other of its real-space translation.

But why then would the captain have died?

The overload device in toto *had failed.* Not enough power to ruin the generator at all, though possibly enough to change the lattice voltage balance and consequently foul that particular maneuver. Again, though, the captain should have come out of it alive.

I thought about everything Alana had told me about Lenn Grandy. From the old school, she'd described him, uncomfortable with wizard gadgets like the Autotorque. Could he have positioned himself close enough to the device during the maneuver to have somehow taken a lethal shock from it while he slept?

Or could he even have been awake?

Awake.

It was as if someone had suddenly turned on the airconditioning to my overheated brain. Of *course*—Grandy had elected to remain awake during the maneuver, trading the pain of cascade point depression for the assurance his Autotorque was indeed performing properly. It was something I could easily visualize Alana doing in that position, especially with her captain's gold barely out of its box.

So I now had a key piece to what had at least partially thwarted Orlandis's sabotage . . . a piece that Orlandis very possibly did *not* have.

Did that really help me? At the moment I couldn't think how, but it was a good feeling regardless to be a step ahead of Orlandis in at least one aspect of this mess. Whatever theoretical knowledge he had about the Colloton Drive and cascade points, he had no first-hand experience with them. If there was any further information about the *Angelwing*'s fate to be squeezed out of Alana's cascade pattern, I had a better shot of getting it than he did.

Useful information from cascade images. With all the other thoughts crowding my mind these days I hadn't really paid much attention to the shock wave this was going to send through the academic brain trusts. The idea that the cascade images were imaginary or purely psychological was going to die on its feet, and all of us who'd always known better could finally thumb our collective lip at them. And yet, the sheer *scope* of it was staggering. I'd heard once that collapsing stars sent out adjusting ripples into the general gravitational field; what we had here was the same sort of effect, but on an apparently *instantaneous* time scale. Even granted the obvious limitations of what sort of information could be conveyed, someone *somewhere* would find a way to take advantage of it.

Assuming we stayed alive to report it.

Gritting my teeth, I brought my mind back to the immediate problem at hand. So Lenn Grandy had been awake during the fatal cascade maneuver; had figured out what had happened and interrupted proceedings in time to save his ship. Possibly by unintentionally replacing the Autotorque's missing voltage surge

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drain, drawing enough of the extra current through his own body to slow the Colloton generator destruction those extra few critical seconds. In which case . . . the *Angelwing* could be literally anywhere along a line nine point two light-years long.

Hell in a bubble-pack.

No wonder Orlandis had been so phlegmatic about the idea of sending a rescue mission out after the *Angelwing*. Even if the searchers thought to look in the space that would normally have been bypassed, their chances of finding anything there would be virtually nonexistent. Even a single light-year—hell, a single light-*month*—was just too much territory to cover, Colloton Drive or no. Somehow, we had to narrow that range down to something manageable.

And all we had to do that with were Alana's cascade images.

Or . . . perhaps Alana herself.

I thought about it for several minutes, and the longer I looked at the idea the nuttier it sounded. Aside from the fact that its chances of proving anything were slimmer than my credit rating, it might very well drive a wedge between Alana and me, might finally precipitate her departure from the *Dancer*.

I didn't want that. I'd grown accustomed to having someone with Alana's competence beside me in all the big and little emergencies that are part of a tramp starmer's life. To lose both her presence and her friendship—and I'd lose both if I lost either. Were the lives of a bunch of rich strangers I'd never met worth the risk?

They would be worth it to Alana. *That* much I knew for sure . . . and I was willing to defer to her better judgment on such matters.

Rolling onto my side, I poked at the intercom. It took a few seconds, but eventually Pascal woke up and answered. "Yes?" he said, yawning audibly.

"I need you to work up a special program for the astrogate," I told him. "One that'll show our position as what it would be if we were on our way to Earth."

"What do you mean, 'if'?" he asked. "I thought we *were* headed for Earth."

"We're going to Baroja," I said. "The passengers weren't—*aren't*—supposed to know, and to make sure not even a hint leaks out I don't want the other crewers to know, either."

"Not even Alana?"

"Especially not her. That's who the trick astrogate's for."

There was a long pause, and I could just about hear his wheels spinning as he tried to come up with a theory to explain this one. Well, he could just stew; I wasn't in much of an explaining mood. "I'll do the calculations for the next maneuver," I continued, "but since she'll be the one actually doing the point she'll undoubtedly want to double-check the numbers. I want the computer gimicked so that hers come out identical to mine, even though her input will be different. Can you do that?"

"Uh . . . yessir, I guess so. Uh . . ."

"You'll get a full explanation after it's all over," I sighed. "For now, just do it. And do *not* let anyone know. *Any*one. Clear?"

He cleared his throat. "Yes, Captain."

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"All right. Your next shift's early enough to start, I guess, so go ahead back to bed. Sorry I woke you."

"S'all right. Good night; or whatever."

For a wonder, he *did* manage to keep it quiet. By the end of his next shift he had the fake astrogate program in place, and he spent the first few minutes of mine showing me how to bypass the facade to get back to the computer. Twenty-eight hours after that, Matope and I had the rest of the props in place.

And then there was nothing left to do but worry.

Six hours later, it was time.

"Kate reports all the passengers have had their sleepers," Alana reported as she came onto the bridge. "What's this I hear about the airconditioning up here not working?"

"Matope's fiddling with the electrostatic precipitators in the vents again," I told her, striving for calm. "I've got all the doors locked open, though, so you shouldn't have any problems with stuffiness."

"Okay." She peered at me as she sat down. "You all right?"

"Sure. Why?"

"You seem jumpy." She scanned the printout I'd made for the upcoming maneuver, then activated the computer for her own check. I held my breath . . . but Pascal had done his job right. Alana watched the numbers come up, compared them carefully to mine, and nodded. "Looks good," she announced. "Shouldn't you be getting below? There's only about fifteen minutes to go."

"I've got my sleeper right here," I told her, patting a pocket. I did, too, though I didn't intend to take it. "See you later."

I left the bridge and headed aft toward the spiral stair . . . but I didn't go down it. Pascal's computer room branched off to my left; I slipped inside and squeezed into the console chair. Two objects awaited me there: a multi-event mechanical stopwatch, and a strap-on eyepiece connected to an optical fiber bundle snaking into the air system vent. Putting the strap over my head, I adjusted the eyepiece . . . and there, seated just as I'd left her, was Alana.

She was already shutting down the ship's systems, protecting everything electronic against the enhanced electron tunneling effects Colloton space created. Feeling uncomfortably like a voyeur, I watched her count down the seconds . . . and with an abrupt, almost angry gesture, she turned on the field.

My first four cascade images appeared, but I paid no attention to them. Finger ready on the stopwatch button, I kept my eyes on Alana. For a moment she gazed down the line of images, her face unreadable but—I thought—oddly calm. Then, straightening up, she turned on the *Dancer*'s flywheel. Beneath me, I felt the rumble begin as I pushed the stopwatch button. Its ticking was soft, but clearly audible over the flywheel's hum. Mechanical clock devices are like that—*all* of them, including the one Matope and I had taken from the lethal Autotorque and hidden in the bridge control panel. The big question was, was it loud enough? Holding my breath, I watched Alana.

And it was clear within a handful of seconds that she did, indeed, hear it.

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Her head turned back and forth, a frown of concentration spreading across her face as she tried to locate the unfamiliar sound. For a moment her eyes paused on the proper section of the panel two meters away—the same distance, according to her layout of the *Angelwing*'s bridge, that the Autotorque mounting socket would be from the duty officer's chair. Her lips compressed to a tight line, she stood up—

And nearly fell on her face.

I winced in sympathetic pain, remembering the last time *I'd* tried to move around with a Colloton field on. Even while sitting still, vertigo was a normal cascade point side effect; actually trying to go somewhere just about tripled the sensation. Alana pulled herself to her knees, staggered almost to the floor again . . . and with a hissed word I was glad I couldn't hear, she grabbed the edge of the control panel, raised herself up again, and slapped at the flywheel switch.

And there it was, the whole explanation: simple, yet so contrary to a captain's normal ingrained preoccupation with staying on schedule that I hadn't really considered it. Aborting a cascade maneuver could add several days to a ship's trip time—a delay that would cause confusion and anger at every stop for at least the rest of its run. But Lenn Grandy had reportedly been a lot like Alana . . . and unlike me, she had little fear of looking foolish. Grandy had heard an out-of-place sound, had been unable to hunt it down through the Colloton field's effect . . . and so had simply turned the damned generator off and to hell with the consequences.

And with those facts in hand I knew where to look for the *Angelwing*.

I almost forgot to key my stopwatch, but I did so without losing more than a second or two. The amount of time Alana had taken to react to the timer's ticking . . . though I now realized that number was only useful, not absolutely vital. The flywheel hum faded into silence, and Alana waited with hand poised above the generator switch, eyes darting back and forth between the mirrored gyroscope needle and the area where the Autotorque's timer was hidden. Around me, the cascade images' interweaving slowed . . . came to a stop . . .

Alana hit the switch, and our patterns began disappearing. Pulling off the eyepiece, I forced myself to my feet and staggered to the door. By the time the last four images were gone I was halfway down the hallway.

She had the proper panel cover open and was reaching inside when I stumbled in. "Pall?" she croaked, cascade depression already beginning to etch lines in her face. "Pall, there's a strange sound coming from—" She stopped abruptly, jerking her hand back, as the timer gave the *snap* of a spring-loaded switch and then fell silent.

I clicked my stopwatch; and with the booby-trap's total time setting, I had the last number I needed. "It's all right," I told Alana, stepping forward and putting my arms awkwardly around her. "It's all right. The *Dancer*'s not in danger. I'm sorry, Alana—I'm *sorry*. But it was the only way I could think of—"

And then our tears began to flow, and we sat down together, letting our tension and emotional pain drain away.

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And a half hour later, feeling like the lowest form of vermin on twenty planets, I told her what I'd done. And why.

The bridge door slid open, and I turned as Orlandis stepped inside. "Captain," he nodded, looking a bit woozy still from the after-effects of his sleeper. "You asked to see me?"

"Yes." Leeds was still standing in the doorway; I caught his eye and nodded, and he disappeared. "We've got just one more cascade maneuver until planetfall," I continued as Orlandis stepped to the other console chair and sank into it. "You'd said you wanted to send a message when we were within range, and I thought this would be a good time to talk about it."

"I understood the next maneuver was several days away," he said.

"Actually, we'll probably be ready within twenty-four hours or less," I told him. "Though that may put you on a rather tight schedule. Reassembling your little star ship, I mean."

Orlandis was good, all right. No jerking of the head; no widening of mouth or eyes; just a slight hardening of his entire expression to show that all my suspicions about him had indeed been right. "What star ship is that?" he asked gently.

"The one you smuggled aboard under falsified contract papers—papers you apparently made up yourself, and you should have risked hiring an expert to do them for you. The one that's in five boxes below, counting the two Aker-Ming Autotorques in our Ming-metal shield. The one you plan to escape on after killing all of us and then setting up the *Dancer* to disintegrate itself. *That* star ship."

He pursed his lips. "You seem to know a great deal about the private cargo in your hold," he said, "which I'm sure various port authorities would be rather upset by. But your accusations are completely ludicrous."

"Are they?" I countered, fighting hard against Orlandis's aura of authority. "Well, perhaps we should leave those for later then, and move onto more technical ground. Do you want to know why your sabotage of the *Angelwing* failed?"

"I had nothing to do with the *Angelwing*'s sabotage," he said. I remained silent, and after a moment he snorted. "All right. As a matter of intellectual curiosity, go ahead and tell me what happened."

"It's very simple. The captain chose to stay awake through the ship's first cascade point out of Baroja, which left him able to hear the ticking of the timer in their rigged Autotorque. He aborted the maneuver, which meant the ship was no longer rotating when the power surge tried to fry the Colloton generator. Which in turn left the ship stranded somewhere out in space where no one would think to look."

"Except you, of course."

I nodded, swallowing. "Except us, yes. Is that why you're planning to kill all of us? Because we know where the *Angelwing* is and can link it to you?"

"I told you before, I had nothing to do with the *Angelwing*'s sabotage."

"Then how did you know enough to ask about Alana's cascade images?" I shot back.

"Oh, I *knew* the sabotage was being

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planned," he said with a slight shrug. "It was set up as an assassination attempt by an underworld group against one of the ship's passengers."

"If you *knew*—?"

"Why didn't I tell anyone? Why should I? I'm not in charge of Cunard Lines' security. *My* job is the making of money—and it occurred to me that there would be a distinct dip in Cunard's stock if and when the *Angelwing* was indeed lost."

"You *knew*, did you," I snarled, some of my anger venting itself in heavy sarcasm. "You knew about the attempt, you knew how it was going to be done, you knew where and how to get hold of a killer Autotorque yourself. You didn't just *know*—you were an accessory before the fact."

Again, he shrugged. "A legal distinction only. Impossible to prove, of course."

I stared at him. The man was even more cold-blooded than I'd imagined. "That's it, then. You'd let an entire shipload of people die for a lousy bit of pocket money."

"It's hardly that," he said coolly. "By selling my stock in Cunard—slowly, of course, over the next couple of months—I'll make enough to buy back a controlling share in the line when prices fall."

"And to get those two months' head start you bought passage on the *Dancer*."

He smiled. "It was easily the most ridiculous thing I'd ever heard in my life, and I nearly fired one of my idea people just for suggesting it. But everyone agreed it would be worth a try, and I began to be intrigued by the possibilities. Besides, with fate having put you and Ms. Keal in my path at the right time, how could I resist? After all, all it would cost would be a few weeks aboard this flying slum."

I bristled. "Plus the chance of having your whole scheme unraveled."

His smile remained as he locked eyes with me. "It was for *that* possibility," he said softly, "that I brought my own ship."

A shiver went up my back. In his own, quietly confident way, Orlandis had just sentenced the *Dancer* to death. "Well, I hope you enjoy the trip," I said as casually as I could. "Going to be a rather long haul for you, though. Unless you just want to hop down to Baroja and start the whole trip over."

His smile vanished. "What are you talking about?"

"Oh, didn't I mention it? The planetfall we'll be making with the next point will be back to Baroja. We're currently sitting just about point zero eight light-years out. About a light-month, if you care."

His lip curled. "So you *didn't* find anyone in Shlomo Pass to send a message with. I suspected as much when Ms. Keal began avoiding me right after the last cascade point. I'd hoped you weren't actually foolish enough to leap on your white horse and come out looking for the *Angelwing*."

"Not *looking*, Orlandis," I corrected. "*Finding*."

He stared at me in disbelief, and in the momentary silence I leaned forward and flipped on the radio speaker. Clearly audible over the background static came the *zhuUUP zhuUUP zhuUUP* of a distress buoy. "We picked up the first signal right after we turned off the Colloton

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field an hour ago," I told him quietly. "Our estimate of their position turns out to have been no more than a light-hour or two off, and we hit our target positon pretty accurately, too. Another fifteen minutes or so and we'll be close enough to raise them with our comm laser."

He glanced quickly at the bridge viewport, as if he thought he'd actually be able to see the liner. "But . . . *how*—?"

"How did we know? Simple. There was really only one place they could be." I reached over and turned off the radio, then hit the switches that put the control systems and computer into neutral/standby. "You see," I continued, "we had your duplicate of the rigged Autotorque to study and we knew quite a lot about the *Angelwing*. *And* we had Alana."

Orlandis's eyes swung back to me, and I could see by their expression that he'd suddenly realized what our being in communication with the *Angelwing* would mean. His right hand dipped into his tunic pocket, emerging with a tiny summoner. "I'm afraid I can't allow you to talk with them," he said softly. "You understand."

"Of course," I nodded. "You're welcome to try and stop me." And with that, I flipped open the Colloton generator safety cover and twisted the knob.

Orlandis actually gasped as the first cascade images appeared around us. "What the *hell*—?"

"Oh, we're not going anywhere," I assured him. "As long as the *Dancer* doesn't rotate we'll come back out in more or less the same position we left. But I was telling you how we found the *Angelwing*. Your assassin friends didn't reckon on Captain Grandy's being awake during the maneuver—and they certainly didn't expect him to shut down the flywheel before the Autotorque had time to blow the generator. We knew Alana would have been killed if she'd been there instead of Grandy, so we set up a similar test last cascade point to see how she'd react, and she did so exactly as I've just said. QED."

"Pretty far-fetched assumption," Orlandis said with some difficulty. He threw a quick glance at the bridge door, then resumed his apprehensive gaze at his cascade pattern.

"Perhaps," I admitted. "But he *had* to have brought the ship to a halt before the timer wound down, else *all* of Alana's *Angelwing* cascade images would have vanished. You following all this?"

He nodded, a short jerk of his head. Again, his eyes darted to the door.

"And finally, the really critical factor: we found out how the Autotorque was supposed to destroy the Colloton generator and how long its timer was set for. Once we knew the ship itself was safe, there were only two possibilities: one, that Grandy had gotten the Autotorque out of the circuit in time to protect the generator—possibly being electrocuted himself in the process, as Alana would have been—or two, that he'd started to take it out, got electrocuted, and still lost the generator. Only in the second case would the *Angelwing* be stranded. So all we had to do then was figure out how far the ship would have rotated in the time available, remembering that Grandy had to rev the flywheel up, rev it back down, *and* get the Colloton field shut off just before the time ran out. That's a pretty tight

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scenario, and with the relatively small distances you get with small rotation angles it let us calculate precisely how far the *Angelwing* had gotten. Turns out we were right."

Orlandis was starting to breathe heavily as the claustrophobic effect of a roomful of cascade images finally appeared to be getting to him. "You've been very clever," he said, looking again at the door. "But you can't talk to the *Angelwing* from Colloton space."

"True, but there'll be enough time for that later." I waved toward the door. "And incidentally, I wouldn't expect your two bodyguards to show up any time soon. They'll be lucky if they don't break their necks falling down the stairs. If they manage to get that far."

Orlandis stared at me, the uneasiness on his face giving way rapidly to fury. "What—?"

"Eiser and Trent, of course. Once we realized how rich you were, we noticed that one or the other of them always seemed to be hanging around you somewhere in the background. No, cascade point vertigo will have them well out of the game by now. If you want to stop me, you'll have to do it yourself."

"*Damn you—*" Orlandis thrust himself out of his seat toward me, hands outstretched like killing weapons even as he piled headfirst into the floor. He staggered to his knees, lunged another half meter before falling again. I stayed where I was as he gathered himself for another try . . . and as he rose up and crawled forward I let my anger boil up within me; my anger at what he'd done to the *Angelwing* and planned to do to the *Dancer*. He reached out an unsteady hand, clutched at my left knee . . . and with my right foot I kicked him as hard as I could. He flipped over backwards, hitting his head on the padded seat he'd just left, and lay still.

Fifteen minutes later, when I judged it was safe enough, I turned off the Colloton generator and went out hunting. Eiser and Trent were easy to find, lying unconscious on the floor halfway from the stairs to the bridge. Close, but not too bad: their tiny guns were still at the bottom of the stairs, where they'd apparently been dropped.

And a half hour later I was talking to an extremely relieved duty officer on the *Angelwing*.

What with all the electronic equipment that got singed by my unscheduled cascade point, the *Dancer* was in pretty poor shape by the time we rendezvoused with the *Angelwing*. But Matope and Tobbar were able to make running repairs, and with the computer intact none of us was especially worried about making the short trip back to Baroja. If worse came to worst, we still had that little backup in our hold.

The passengers were somewhat more troubled. They started out furious at having had to actually experience a cascade point; shifted to astonished and only slightly less angry to find we were nowhere near Earth; and finally turned to shock at finding out the truth about Orlandis and company. I decided not to strain them further with pessimistic reports of the *Dancer*'s spaceworthiness, but dropped our three prisoners off with the *Angelwing* for safekeeping and headed to Baroja to whistle up the cavalry.

Through all of it Alana was very

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professional, never bringing up her feelings about the whole incident and my handling of it, but doing her part to ensure that the *Dancer* made it through in one piece. But her underlying tension was plain; and I therefore wasn't really surprised when she came to my cabin two hours after we were safely down on Baroja to discuss her resignation.

"It won't be the *Dancer* without you," I told her when she'd explained her errand. I tried to keep my voice steady and emotionless; just another bit of business, however unpleasant and depressing, that I had to handle. I didn't succeed very well.

"That's a . . . a nice compliment," she said, no better than I'd been at hiding her emotions on this. "I've enjoyed working with you, Pall—with all of you. But it seems to be time to move on."

I sighed, wondering what I should do. *Offer her some inducement—any inducement*—to stay? Get down on my knees and beg? Or should I simply acknowledge that she was capable of making her own decisions and let her walk out with our individual dignities intact? "You'll be badly missed," I said at last. Even now, I realized, with such a loss staring me in the face, I couldn't take the risk of losing my dignity in front of her. Of looking foolish. "You know more about dealing with people than I ever will. I don't suppose . . . don't suppose there's anything I can say that would change your mind?"

She shook her head minutely, tears glistening in her eyes. "It's a matter of trust, Pall. Trust, and a realistic evaluation of my strengths as well as my weaknesses. If you can't make that evaluation by now, then I don't think you'll ever be able to."

I took a deep breath. "Alana, look . . . I'm sorry I put you through the hoop—I really am. I suppose if I'd thought it out a little better I might have been able to piece together what had happened without having you reenact it. But I was stuck, and we were running out of time."

"You could have come to me." Her voice was quietly accusing. "You didn't know from the beginning that you'd need to reenact things, so there wasn't any good reason to keep me in the dark about Orlandis. Trust, Pall—you trusted Wilkinson with part of it, and Matope, and even Pascal. But me you completely cut out."

"But I *had* to. You were spending time with Orlandis—*lots* of time—"

"And you didn't think I could handle the knowledge that he might have killed Lenn Grandy? What did you think you were going to do, keep me in the dark forever? Just because I'm able to get close to people doesn't mean I lack emotional strength—"

"Who said it did?" I interrupted, frowning. "Good God, Alana—you've got more deep-down toughness than the rest of us put together. *I* know that."

It was her turn to frown. "Then . . . why didn't you tell me?"

"Because you were close to Orlandis, like I said . . . and all your other qualities aside, you're a *lousy* actress."

Her mouth fell open a crack. "You mean . . . *all* you were worried about was Orlandis getting tipped off?"

"Of course."

She licked her lips. "Oh. Well.

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Uh—" She stopped, looking acutely uncomfortable.

With our individual dignities intact, I reminded myself. "If you'd like to join up," I said, as casually as I could around the lump in my throat, "we just happen to have an opening in the first officer's position."

It was an old, old line . . . but for all that, it worked. "Sold," she said with the first smile I'd seen on her in days. "Thank you, sir. I hear the *Aura Dancer*'s a good ship to serve on."

But of course it wasn't the *Dancer* we shipped out on three months later. There'd been just too much ship-wide damage to be worth repairing, at least in the opinion of the Cunard Lines officials assigned to handle our reward for saving the *Angelwing*. Like so many people spending other people's money, they opted for the simpler if more expensive approach.

Certainly *I'm* not complaining. The *Daydreamer* is a beauty of a ship, with the most up-to-date equipment Cunard's money could buy . . . including the necessary mounting socket for an Aker-Ming Autotorque.

An Autotorque which is currently still in its shipping box in our Ming-metal shield. I figure we'll haul it out and use it one of these days, but strangely enough, neither Alana nor I is in any particular hurry to do so. For all the stress and trouble cascade images have brought into our lives . . . well, I guess it just wouldn't be like the old *Dancer* without them. ■

● Many of you probably opened this issue eagerly seeking the Analytical Laboratory results for 1985. Relax; we couldn't get them in this time, but they really should be here next month.

Now that I've laid *that* to rest, I can get to the main business of our July issue. The cover story is Bob Buckley's "Red Wolf," and the cover will be by Vincent di Fate—but if you think you know what kind of cover to expect from Vincent, you may be surprised. The driving problem of the story concerns the terraforming of Mars, which, by the time of the action, is pretty well advanced. But terraforming is not a simple process; an important part of creating a new environment is creating things that can live there. Those things have to be able to take care of themselves in the new surroundings, and if you do your job too well they may be better at that than you are. At which point some question arises as to who's really in control. . . .

We'll also have Part III of Vernor Vinge's *Marooned in Real Time*, of course, plus an interesting speculation by Rick Cook on how we got to be who we are, and very probably stories by Harry Turtledove, Jerry Oltion, and Rob Chilson and William F. Wu.

IN TIMES TO COME

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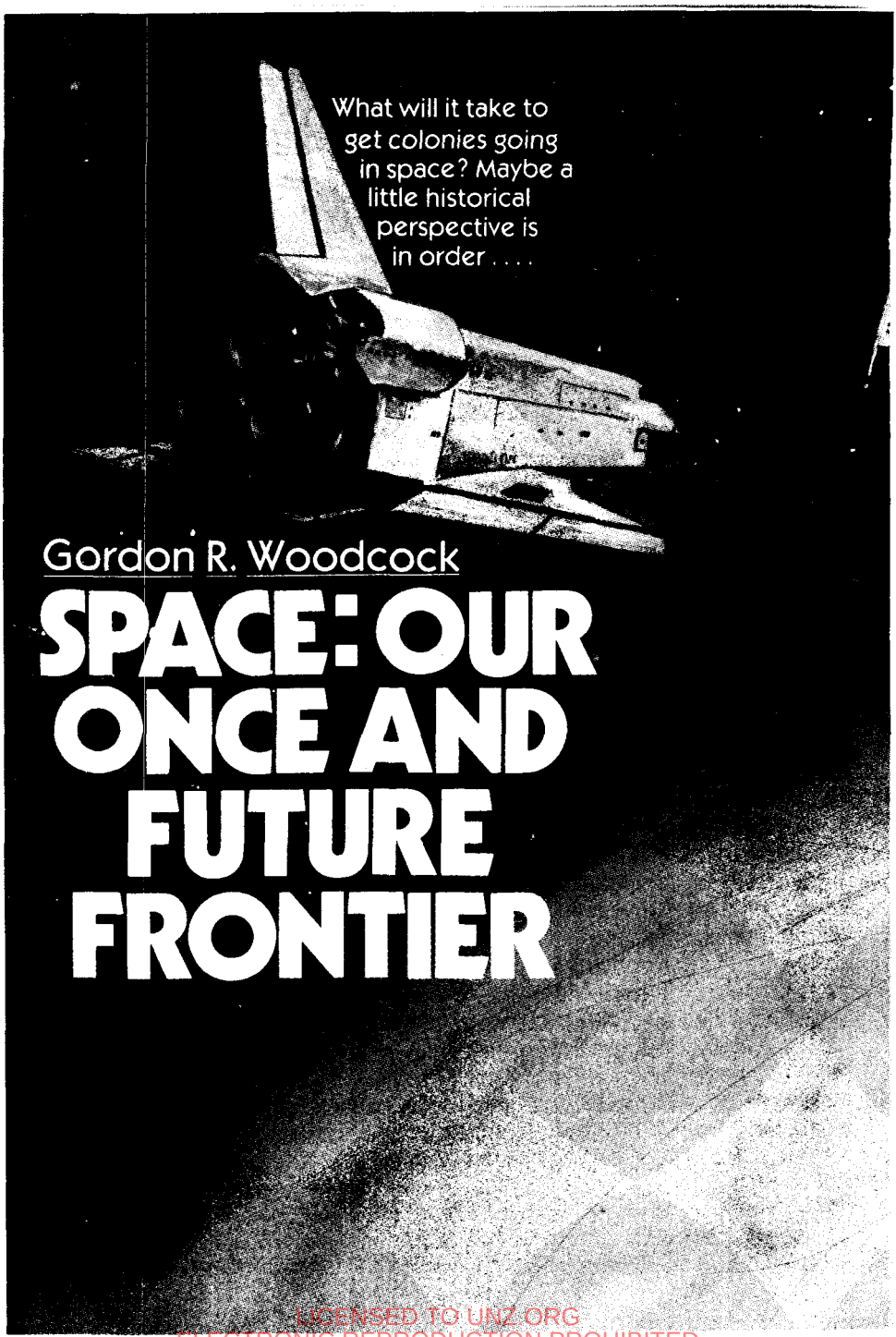
What will it take to get colonies going in space? Maybe a little historical perspective is in order . . . .
Gordon R. Woodcock
SPACE: OUR ONCE AND FUTURE FRONTIER

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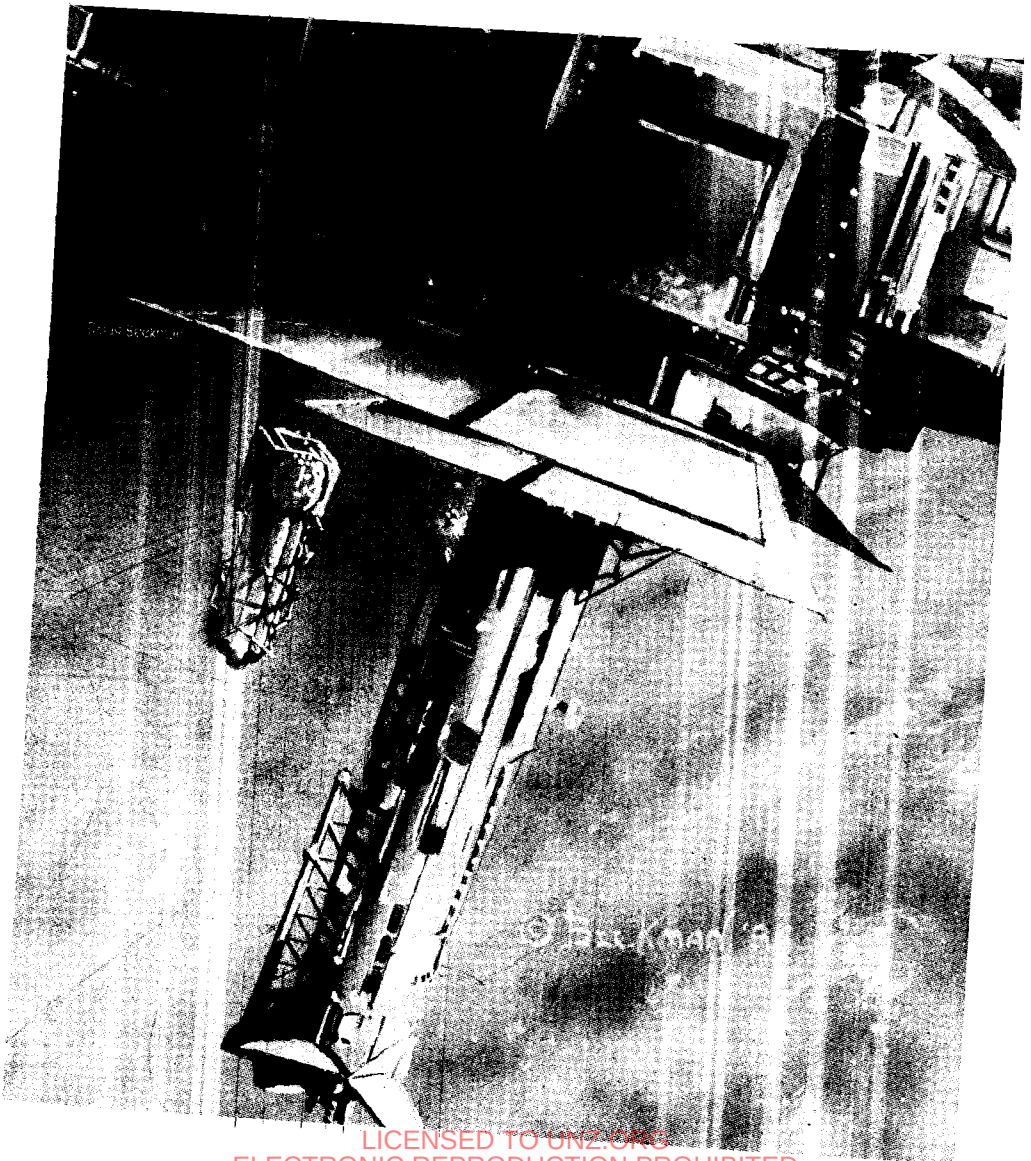

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Nothing gets people and their societies going more than opening and developing a new frontier. Exploration and discovery of new sea routes and continents stimulated the Renaissance in art and science in Europe; this created contemporary Western society and thought. From our thirteen colonies until the West was won and settled, the United States was a frontier society. Frontiers have been a part of our very being.

There are, however, no big-time frontiers left on this planet. The U.S. is fortunate even to have Alaska. Canada and the Soviet Union have undeveloped arctic areas, but like Alaska, they are not major frontiers. Antarctica is almost big enough and very undeveloped, but it is, by international treaty, a scientific preserve not for settlement or development.

OK, what about the oceans, at least the shallower sea bottoms? Underwater apparatus is quite sophisticated and aquanauts have lived for weeks in artificial seabed habitats. Material riches exist there and fish farming schemes seem plausible enough. The cost of getting there is not prohibitive. Yet few adventurers and entrepreneurs clamor to develop the undersea frontier.

Why? It's a curious puzzlement. But the undersea is an alien place. One cannot walk, there is no horizon, one cannot see the sky. It just doesn't *feel* like a frontier. "Always the land lay wide about them, the vast sky overhead." (—Louis L'Amour, *Frontier*, describing the western U.S. in frontier days.)

What about space? Is it, or will it be, a frontier? It has been called the high frontier, the last frontier, the eternal frontier, the endless frontier, the final frontier, the infinite frontier: all apt enough. Space has been touted as a frontier, at least by a few visionaries, for most of a century.

"Mankind will not remain on the Earth forever, but in its quest for light and space will at first timidly penetrate the atmosphere and later will conquer for itself all the space near the sun." (—Konstantin Tsiolkovskii, 1903.)

"This is the goal: to make available for life every place where life is possible; to make inhabitable all worlds as yet uninhabitable and all life purposeful." (—Dr. Hermann Oberth, 1923.)

"There can be no thought of finishing, for aiming at the stars, both literally and figuratively, is the work of generations. . . ." (—Dr. Robert H. Goddard, in a letter to H. G. Wells, 1932.)

These visions are unrealized. Despite all the brave talk and many flights into space, space is today not a real frontier. You and I cannot go there to stake out a homestead, a ranch, a mining claim. We can't go there at all unless selected as one of the fortunate few shuttle passengers carried by NASA. We cannot go simply by booking passage. No one sells tickets.

Unlike the sea bottom, there are people clamoring to open the space frontier. The L-5 Society (1060 E. Elm, Tucson, AZ 85719), with many thousands of members, has space settlement as its main goal. Were the space frontier widely perceived as attainable within a reasonable future time, there would doubtless be tens of thousands, perhaps millions more. There is much literature on the subject; most science fiction deals with some aspect of outer space. (Some,

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but far less, science fiction does deal with the undersea world.)

"It is orthodox—to believe that Earth is the only practical habitat for man, and that the human race is close to its ultimate size limits. But I believe we have now reached the point where we can, if we so choose, build new habitats far more comfortable, productive, and attractive than is most of Earth." (—Gerard K. O'Neill, *Physics Today*, September, 1974.)

Idyllic visions of beautiful artificial worlds in space, briefly sketched by Dandridge Cole two decades ago, are vividly portrayed in great technical detail by Dr. O'Neill and his colleagues. "Space art," paintings and illustrations of such visions, is popular. However inspiring, these ideas also create a perception of enormously costly developments far beyond the reach of a society mired deep in deficit spending. The hope of the space frontier is lost in hopelessness of ever being able to afford it.

O'Neill's space colonies are truly awesome in scope. It is literally proposed to depopulate the Earth by construction of space habitats and by emigration of people fast enough to stay ahead of population growth. Indeed, there is no *fundamental* reason why it isn't possible. It doesn't founder on availability of resources or energy as one might imagine. There is, of course, the question of who is going to pay for it. Gerry's original *Physics Today* article argued that improvements in the human quality of life were sufficient reason. (They probably are.) Later works assumed construction of solar energy collection stations in space for supply of electrical energy to Earth. Still later proposals invoked technical flummery about self-replicating intelligent machines (a human being may very well be the simplest possible such device) so as to bring down the projected investment cost. The net result has been to portray colonization of space as not of this century or the early part of the next, an idea whose time has not yet arrived, and cannot yet even be forecast.

On the other hand, historical analogs say that something should be happening in the near future (the next few decades). The Spanish began to occupy the West Indies only a few years after Columbus discovered America (Figure 1). Theirs were not true colonies, but more like military bases. Cortés sailed from Cuba in 1519 and was made "governor" of Mexico in 1522, only thirty years after Columbus's historic voyage. (Thirty years after Neil Armstrong's historic first steps on the Moon is July 20, 1999.) The first Spanish colony in what was to become the United States was established at St. Augustine, Florida in about 1565. The Virginia Company founded Jamestown in 1607. In 1620, the Pilgrims landed at Plymouth, Massachusets.

The history of Antarctic exploration is also shown in Figure 1. There were early sightings just after 1800, e.g. by whalers pursuing their prey, and brief landings a little later. This was followed by a period of almost no interest lasting about fifty years. The industrialized world was exploiting more profitable frontiers in America, Africa, and India. Antarctica offered nothing to prospective settlers of the time.

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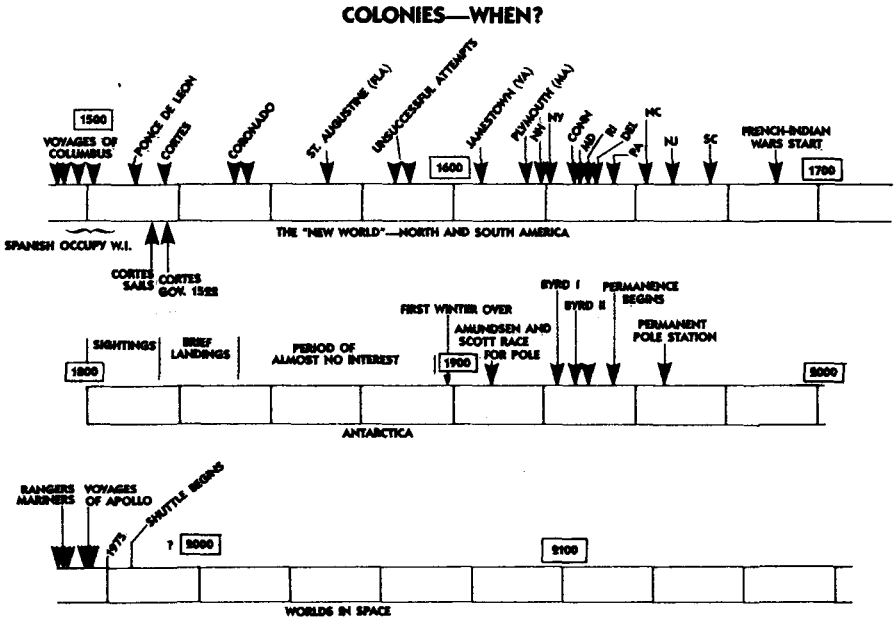

In 1910, Amundsen and Scott raced for the South Pole with dogsleds; Scott's party did not survive the return trip. Dogsled technology was not really equal to the Antarctic challenge, but as Hans Mark (recent Deputy Administrator of NASA) is wont to point out, multi-engine aircraft with skis were just the ticket; this technology was exploited by Admiral Byrd in the 1930s. Permanence in Antarctica began for military intelligence reasons during World War II, and the forbidding continent now enjoys a scentific population of thousands. There are no true settlers, but Chile and Argentina are said to be considering it.

The early space pioneers like Oberth and Goddard had in mind settling the Moon or Mars or some other natural body. This became unfashionable when space colony designers pointed out the inefficiency of natural bodies. "In space, solar energy is dependable and convenient to use; the Moon and asteroid belt can supply the needed materials, and rotational acceleration can substitute for Earth's gravity." (—O'Neill again.)

A planetary body is many billions of times more massive than constructed habitats with the same living space. Further, there are really only two natural bodies of practical interest, the Moon and Mars, and their combined surface area could no more than double the present living space for mankind. From the grand vision point of view, planetary bodies are not the answer. But how to start?

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Planetary bodies have one outstanding attribute: they are already there. A space settlements scheme using planetary bodies need not begin by engineering a gargantuan structure that would dwarf the largest oil supertanker.

Perhaps the space settlement enthusiasts have been thinking too big. The prospect of two rather small new worlds, the Moon and Mars, may seem too small to big thinkers, but is probably too bold for many. Indeed, it has always been thus:

". . . As to this Louisiana, this new immense unbounded world, if it should ever be incorporated into this union. . . . I believe it will be the greatest curse that could at present befall us. . . . We have already territory enough. . . . I would rather see it given to France, to Spain, or to any other nation." (—Senator Samuel White, 1803.)

History tells us a few more things about settlements and frontiers. First, historical colonization has started modestly. The early colonies in the Americas were dozens, not thousands or millions of people. Second, crass motives were behind many of them: gold, profits, territory. (The Virginia Company was supposed to make a profit. Although not highlighted in most of our history books, it went broke and created a small scandal.) Some, like the Plymouth colony, were founded by people escaping oppression. Australia began as a penal colony. Colonies established by governments were intended to serve some important national objective such as overseas bases for military power or sources of national wealth and trade.

"The importance of the opportunity to get rich quick must not be overlooked. Gold and silver were the most obvious sources of new wealth. . . . Chances of lesser men acquiring European estates by fighting for them (by the late 15th century) diminished. Land in the New World became an attractive alternative." (—*The Exploration and Colonization of Space: Lessons from History*, L.C. Wolken, Center for Education and Research in Free Enterprise, Texas A & M.)

So: We start small, look for early opportunities, and go for important national goals like economic growth. What's out there with economic value? The special vantage point of space for communications is already widely exploited by a growing industry. Solar energy from space has been thoroughly studied; although feasible, it does not fit the "start small" prescription. Low Earth orbit is too accessible by shuttle to be a sensible site for settlement. Besides, there's nothing in low Earth orbit of material value. How about the Moon? What does it have?

The Moon has natural resources! The Moon doesn't, as far as we know, possess rich ores, but its rocks contain important quantities of metals, silicon, and oxygen. Moon rocks and soil can readily be fabricated into bricks for radiation shielding. This can be important anywhere in space that permanent residence is contemplated. Oxygen from Moon rocks could be exported to Earth orbit at much less cost than it can be delivered there from Earth itself. This strange situation exists because the Moon's gravity is far less than Earth's and most of the cost of space transportation comes

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from fighting gravity. Oxygen is a primary rocket "fuel" (actually, it is an oxidizer); space propulsion systems now in development would use about 85% oxygen, with the balance hydrogen. We do not know of recoverable quantities of hydrogen on the Moon but some scientists hope that water ice will be found in perpetually shadowed craters at the lunar poles. If ice is indeed there, it would be exceedingly cold, as solid and permanent as granite, and as valuable on the space frontier as is gold here on Earth.

On the space frontier, metals and silicon will be a byproduct of oxygen production. The Moon has plenty of iron, aluminum, and titanium, with smaller amounts of many other metals. Powdered nickel-iron is found everywhere and can be separated from rock powder by magnets. Silicon, the main ingredient of solar cells and electronic microcircuits, is very plentiful. Constituents of many types of glass are there; tiny glass beads are found naturally in certain Moon rocks. Some scientists believe that we will discover new ceramic and composite materials by experimenting with Moon stuff.

Yessir! The Moon is an exciting place for industrial development! So what are we waiting for? Well, for one thing, we too quickly remember Apollo. Its billion-dollar rocket ships carried astronauts two at a time to the Moon for a few days' stay. Three thousand tons lifted off from Earth on each flight, but only six tons returned and even that could not be used again. We think of flights to the Moon as forever fantastically dangerous, difficult, and expensive. At the cost of Apollo, only gem diamonds could possibly be exploited commercially, and even that is doubtful. At the cost of Apollo, industrialization and settlement are out of the question!

Thinking that trips to the Moon will always be as expensive as Apollo is a little bit like thinking that computers will always be as expensive as the ENIAC of days gone by. Cutting the cost of space travel will probably never be quite as dramatic as the computer revolution, but dramatic nonetheless. And we are already further along than people realize!

What each huge Apollo Moon rocket lifted into space is about like three space shuttle flights. And that's no longer a big deal. With a space station in orbit as a place to get things together, three shuttle flights could deliver the hardware and propellants for a return trip to the Moon. Furthermore, the hardware is a direct derivative of rocket stages and crew cabins now in development for other purposes. About all we need special for the Moon is landing legs on the rocket stages and a throttle on their engines so that thrust can be controlled for the landing. By the time we get the space station up, going back to the Moon will be a piece of cake if we want to do it! And since we've made many improvements in space propulsion and vehicles, we can plan to land at least five people per trip instead of just two.

Of course, one trip to the Moon does not a colony make. But it's a start!

The living quarters we are developing for the space station can also be a big help. Once we have a basic living mod-

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ule for use in space, we can use it almost anywhere, certainly on the Moon. We have to get it (or them) there, of course, but the rocket stages designed to carry people there can also carry cargo. A very modest base could be set up by about six cargo flights and a more or less generous one, including initial oxygen production equipment, for ten to fifteen flights.

To get an idea how this new scheme for getting to the Moon might work, let's take an imaginary trip. Let's suppose that NASA has decided to take a group of journalists to visit the Moonbase because of public interest in developing a settlement there.

The three of us have arrived at the Cape after two weeks of intensive training. We have flown the notorious "vomit comet," the KC-135, for zero-g familiarization, worked in various simulators, and had basic spacesuit training. We learned how to get into and out of a spacesuit and how to know if something is going wrong with the suit in time to yell for help. Suit drill was like scuba school with its emphasis on knowing the equipment and always going with the buddy system.

After the traditional prelaunch breakfast of steak and eggs, we ride to the launch pad and up the elevator to the white room. The shuttle hatch is open and each of us steps carefully inside, taking seats in the middeck area as directed by the ground crew. We strap into the seats and everything is checked. I think back to when I asked my editor to give me some adventure assignments. I had in mind something like backpacking and whitewater rafting, not this insane business of going to the Moon! My editor said that he wanted to go but that the publisher told him to send someone expendable. So here I am!

The countdown seems interminable, but finally approaches the time of liftoff. Startup of the orbiter's engines is a distant rumble accompanied by a distinct shaking of the vehicle. The booster rockets start with a loud boom and the shuttle lurches off the pad with a sudden jolt followed by steadily building acceleration pressure. After a smooth ride for about 45 very long seconds, we begin to shake much like a jetliner flying in severe turbulence. We are approaching "max Q," the point of maximum aerodynamic forces. The shuddering builds for about fifteen seconds; it seems worse than we were told and I wonder if something is wrong. But it peaks and then drops off rapidly.

The second minute passes more quickly than the first. We hear something about "go for SRB sep," a thud and momentary clatter, and then eerie silence, with only the distant rumble of the main engines. Suddenly we can hear spacecraft noises, fans and occasional subdued clicks and clacks of valves operating.

Acceleration increases to a point of mild discomfort, something like a carnival ride in my distant memory, but the shuttle couches are far more comfortable than the ride was. Four minutes have passed since liftoff. Timewise, we are halfway to orbit. I hear Capcom with "go for TAL" and soon afterwards, "go for ATO"; "go for MECO," and

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the acceleration suddenly vanishes. My stomach feels like it has risen into my throat. Momentary panic, and then I realize it's weightlessness, zero-g. "Better get used to this, several days of it to go," I think, trying to convince myself that I am *not* nauseated.

"Come upstairs!" A cheery call from the astronauts. Moving very cautiously, I pass through the hatchway to the flight deck. The shuttle has rolled over from its inverted ascent flight attitude and the windows look to space. "Well, there she is." The command pilot gestures toward a bright speck high above the Earth's distant horizon. "We're just about an hour from latchup."

It looks a long way off to me. I've seen it from the ground and it seemed just as close. The Earth is going by rapidly below us. Already I can see the shores of Africa. But the space station just hangs there with no discernable movement.

Half an hour later it is much brighter; we are heading into the Earth's shadow and already the space station is over darkness below. The cross shape of the "power tower" is clearly discernable. Then suddenly it fades and disappears! My alarmed expression must be evident because our pilot says laconically, "In the shadow. We'll be right after 'er. Soon as we go in, your eyes will adjust and you'll see her position lights. Don't sweat it. Berthing in the dark's a piece of cake."

As we approach, Earth's horizon is just beginning to glow red with the impending space sunrise. I can dimly see our Moonship in the worklights of the space station; it is an unsightly stack of spherical tanks and bracing struts, all covered with the ubiquitous gold-colored foil wrap of space. At the "top" is our crew cab, shaped like a four-meter-diameter aspirin tablet, and a large box-shaped object, apparently cargo for delivery to Moonbase. We pass "under" the station; our Moonship is no longer visible, hidden by the station cabins and superstructure. Our shuttle slews abruptly into berthing attitude. Our copilot moves to the aft flight deck where she can see the berthing target. Out the forward windows, we are looking up the tower superstructure toward the atrophysics observatory. The space station looks as "tall" as a skyscraper.

Verifying safe latch-up to the station and balancing cabin pressures seems to take a long time. Our pilot explains that the air pressure force in the berthing passageway trying to blow the shuttle and station apart is about ten tons, and that a latch failure would be disaster. "Take all the time you need," I say.

Each of the four space station cabin modules is almost as large as a railroad boxcar, and jammed with instrument panels, equipment, cables, and seemingly with people. Although the original plan was for a crew of six, we are told that there are usually ten or twelve aboard, not counting transient shuttle and lunar crews. Upon inquiry, we learn that there are presently seven professional astronauts: four Americans and one each Canadian, Japanese, and French, plus Chinese, Mexican, Indian, and two American industrial mission specialists.

"Hey, you tourists! Let's go! If you will get your stuff over here and your

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butts on board, we can push off an orbit early." This from a lanky, unkempt-looking fellow with about three days' growth of stubble. The face is sturdy and angular, with dark intense eyes that seem to look straight through me.

"You must be Keith Ericsson."

"Yeah, I'm your tourguide. You three are on my duty ticket, and I'm supposed to be nice to you so you will write nice stuff about Moonbase. But I don't have to like this chore."

The Moonship cabin is about the size of a small apartment living room, circular, with eight seats on the floor. Three of them have obviously been jury-rigged. There is a hatchway in the rear of the cabin as well as the one in the "ceiling" through which we entered. Storage lockers, a toilet, a rudimentary galley, and spacesuit lockers occupy all available wall space except for the flight control stations at the front of the cabin. There are only two complete spacesuits in the lockers; this provokes an obvious question from one of my companions.

"How do we get outta this thing when we get there?"

"We have a spaceway. Like an airport jetway, but pressurized."

"And if it craps out, we just go back to Earth?"

"We can jury-rig an airlock in the overhead hatch if we have to, and get suits from the base. Suits are heavy. We only carry enough with us for emergencies."

Motion outside one of the small windows catches my eye; I notice that we have separated from the space station and are drifting away. "When do we actually start engines?" I ask.

"Gotta have five kilo separation. If we blow this thing up, we don't wanna take the station with us."

Comforting thought. This sort of risk control may be routine to space people, but it scares the hell out of me.

A gentle lurch tells me that we are no longer drifting, but slewing to ignition attitude. "Short count," says Ericsson.

"Five, four, three, two, one, hit it!"

After hours of zero-g, even oh-point-one-five g seems heavy. The engines make a faint whine; the g-force builds very gradually, even seems to decline as I become accustomed. The burn goes on and on. After about fifteen minutes, it is apparent that we are gaining altitude; Earth, visible out the windows, is dropping away. At half an hour, we have climbed to about two thousand kilo and Ericsson announces, "Booster sep." Thrust tails off, there is a very slight jolt, and then it resumes. By this time acceleration has roughly doubled and seems almost like one g although it is only about a third. About ten minutes later, thrusting stops again and I hear Ericsson announce to Capcom, "We have TLI."

Ericsson slews the craft slightly so that we can all see the Earth. Amazing! It is visibly shrinking as we speed away at almost twenty-five thousand miles an hour! We can share the eerie feeling that the Apollo astronauts must have felt decades ago as they watched the ancestral home of all known life recede into the distance. Now, of course, we realize that there is a small, growing island of life at our destination.

Some wag once remarked that flying

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consists of long periods of utter boredom interrupted by brief intervals of sheer panic. Space flight is like that, I think. We will spend almost four days coasting to the Moon, with nothing to do except look out the windows, eat, sleep, talk, maybe file a story or two, and wonder how long it takes to die out here if an emergency does arise. Not long at all, I say to myself.

"OK, gang, be sure you're strapped down. We're fixin' to burn in. Ignition in fifteen seconds."

It is almost beginning to seem routine! After a ten-minute burn, we are in lunar orbit. The Moon is dark below; we are in its shadow. Already we are thrusting again, but only for a few seconds, to begin our final descent. I see a bright horizon ahead and abruptly we come into full sunlight. The Moon slips by below us faster and faster as our descent orbit carries us ever lower. We are rushing along at a typical commercial jetliner altitude of about fifteen kilometers, but at more than six times normal jetliner speed.

"Fifteen seconds to PD," Ericsson says to Capcom. Then to us, "Check your straps! We're gonna light up for landing. Short count. Five, four, three, two, one, ignition! Bringin' 'em up to full thrust. Touchdown in five."

Sitting about mid-cabin behind the pilots, our view out the windows is poor; we can see nothing but black space. After about three minutes, I sense a rather abrupt attitude maneuver and the lunar horizon swings into view out the pilots' windows. We are close now! "Final descent. Landing pad in sight," Ericsson announces to Capcom and to Moonbase.

I can't really see very well out the small pilots' windows, but the landing seems for all the world exactly like a helicopter landing on a helipad. After touchdown, a very long time (it seemed like hours but was probably fifteen minutes) is spent attaching and checking out the spaceway.

I unstrap and stand up to exit. Moon's one-sixth g is a weird sensation! Until now, it has been zero-g except when strapped in for thrust. I can't even walk! The attempt throws me off balance and I lunge upward toward the cabin ceiling, falling back awkwardly onto my haunches. Ericsson laughs and says, "It's actually easier in a suit because all the extra weight helps to hold you down. You'll get used to it soon enough."

With that, the astronauts bound through the spaceway, leaving us to struggle with learning to walk in lunar g.

Stepping gingerly through the spaceway and maintaining a steady hold on the handrail, I get my first glimpse of the lunar settlement. The module interior looks entirely like one of the oversized beer cans in which spacesuit operations were conducted at the space station. There are windows looking out on the Moon, and several spacesuits awaiting use. The main difference is that people are standing on the floor, instead of floating about. Ericsson is waiting for us. "Take us to your leader," I quip with a nervous laugh.

"I suppose that's a writer's idea of humor," Ericsson responds.

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A well-lighted tunnel leads into the settlement proper (NASA calls it a base). The tunnel makes a pronounced S-turn; there is a branch to what appears to be another can with several windows just before the start of the S. The cans farther back do not have windows. I ask Ericsson about this, to learn that spasmodic dangerous solar radiations (flares) occasionally make the cans with windows off limits. The rest of the settlement, he says, is buried under feet of Moon dirt for radiation protection. "This is sort of like a bunch of rats living in a sewer," I think to myself.

The settlement is, as I know, small. Five modules are devoted to crew living and working space and four others to growing food, still somewhat experimental, I am told. This does not count the two "window" modules that are sometimes off limits. We walk through a module that is obviously used as a repair shop. There is also some apparatus that looks experimental—just all jumbled together. Ericsson remarks that ceramics are a black art and that one would know that simply by looking at the equipment. Leaving this module, we encounter a branch and go to the left into an office-like work area. At the far end is a door with a sign, "The success and safety of this operation depend on *you. Don't screw up.*" This is obviously Base Commander Steve Jefferson's office.

The sign makes me realize afresh just how far from home we are, and that the Moon is a very unforgiving place. Here, survival itself depends on technology, to a degree beyond anything before.

Ericsson raps and saids loudly, "Your PR group is here." Entering, we are greeted by a slightly graying fellow who looks exactly like a movie version of an airline captain.

"Come on in!" Jefferson says. "Welcome. You three are our first guests ever. Our friends at the space station have visitors all the time, it seems, but we're a bit off the beaten track. I'm truly glad you're here. We need some first-hand reporting about our mission up here instead of the junk I have been reading."

"What do you care what anyone writes?" I ask.

"Well, I suppose all of us like to be well thought of. But more important, what we're doing up here is paid for by the taxpayers. They have a right to know. Besides, even though we're a very small part of the federal budget, we have to have a favorable vote in Congress every year to keep going. Enough bad press and Moonbase goes down the tubes."

"I suppose my next logical question is 'Why should you get funded?' And on a more personal level, why are you here? I know how much you get paid as a government employee. Airline pilots do a lot better."

"I can just tell you that I am an astronaut, this is my job, and here I am. That's probably what Ericsson, for example, would tell you. But there's more to it. I don't know if you noticed, but from here you can see Earth. Always. It just hangs there in the sky, very bright when the sun is behind us, and dark when the sun is beyond it. From this vantage point, Earth is a garden world. *Our* garden world. This Moon is a des-

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olate, gray, dead place except for the tiny island of life and color you see here. The other worlds of the solar system, as exotic and sometimes beautiful as they are, are just as dead.

"We humans have been despoiling our garden world for thousands of years. In the last two hundred, we have been working hard at it. It's time to stop, to save Earth's special beauty. Out here, we can build any sort of industrial plant, and make any sort of industrial product whatsoever. Energy and raw materials are plentiful for the taking. Nothing gets polluted because there's nothing to pollute. It's all dead anyway."

"That's crazy!" I respond. "You have a mere handful of people out here. The industries you're talking about involve billions of people!"

Jefferson sticks to his guns. "You're right—we're not quite ready to take over Earth's steel industry. We're still struggling to get a small oxygen plant going. But remember that the first European settlements in the Western Hemisphere were no more than dozens of people. And the trip was a lot rougher than a trip to the Moon is today, although perhaps not as expensive. Oxygen, by the way, will be our first export. We're planning pilot shipments next year."

"You really believe in this, don't you?" I ask.

"If I didn't, I woudn't be here. We're already doing quite well on self-sufficiency, you know. We're just about ready to commit to adding several people to our crew, based on our success so far in food production. We can add them without any increase in resupply flights. We'll be a little crowded for a while but we expect to start aluminum production next year and then we'll be able to build more pressurized space without having to ship the whole works from Earth. And I'll let you in on a little secret. One of our ladies is expecting a baby in about three months. She and her husband have been here almost a year. We haven't advised mission control because they would want to bring her back and she wants to have it here!

"If you all need anything while you're here, just let me know. We're going to let you bunk in the crew ops area. It's sort of camping out, but it's the best we can do without evicting some of our regular people from their quarters, and I refuse to do that. See you at breakfast."

I ponder what I have heard for a long time. It does not quite fit what I expected. I anticipate a sort of white-scarf, test pilot attitude and what I am hearing sounds a bit like the sodbusters of the old West. The business about the pregnant woman really threw me! Who would want to have a baby in this rat's warren? I decide I must get a chance to talk to her.

I am surprised at breakfast to be served *freshly squeezed* orange juice and freshly baked bread. "We are nearly self-sufficient on fruits, vegetables, and grains," explains Ericsson. "Meats and dairy products come from Earth. Livestock is still beyond us. They're experimenting with chickens at the space station. We're gonna let them work out the problems with livestock before we try it up here."

After breakfast, we take a walking

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tour of Moonbase, ending with the food growing areas. We are introduced to the person in charge. "This is Diana Vorschuk," says Ericsson.

I immediately see she is the one I want to talk to. "How are you keeping your secret from Houston?" I ask. "Staying away from video cameras?"

She flushes slightly and admits avoiding cameras. "The medic who arrived with you has obstetric experience. He advises me not to travel or expose myself to unusual acceleration forces. I can come clean with Mission Control now."

"Why do you want to have your baby here?" I ask.

"Well, to be honest, at first I didn't think much about it. It must have been three months before I even realized I was pregnant. We are so busy and involved here that I wasn't counting days. Even then I didn't feel any urgency. And the idea of staying just grew on me. The trip back to Earth is very strenuous. My baby will be just fine here. I guess it's more of a case of 'why not' than of 'why.'

"Jim and I are very happy here. Yes, it's small. And crowded. And sometimes risky. But the future is here; it's in our midst; and the people are the neatest I've ever known. Jim is starting to make tank plate in his lab. Someday soon, we'll build a great city right here out of these lovely, drab, gray Moon rocks! We're building a new world; a new civilization. At times I almost feel as if I can just reach out and touch the stars!

"There's only one thing that worries me. Arthur Clarke wrote about space people never really adapting to Earth's gravity. Whenever I work out in our centrifuge at one g, I know exactly what he meant. If my son grows up here, I wonder if he will ever be able to live a normal life on Earth. Someday we can be a true settlement, but now we're just a base. People on Earth who will never feel the wonder of this place are paying for it. Guilt? I don't think I'm on a guilt trip; I just hope we get to keep this thing going until we can make it on our own. I don't want my child to have to return to an oppressive gravity field he will never think of as home."

We talk for a long time. Something here really turns these people on! I can't quite grasp it, can't see why anyone would give up evenings at the Kennedy Center for this desolation. But whatever it is, it is strong here; it rules their lives. Perhaps, a long time ago, it was called "frontier spirit." At any rate, it isn't for me. I'm from the big city and I like it there. But I must do my best to write about this frontier spirit and how it drives people to build a civilization out here in this desolation, from nothing but these ancient gray Moon rocks.

Perhaps it will not start quite this way. But where people are, settlements will be, if there is anything to build from. The Moon will surely be first; we must settle and industrialize the Moon to follow any course toward space settlement.

After the Moon, opinions diverge. Some say Mars; some would build settlements from Moonstuff (or asteroid steel) after the schema of O'Neill. It probably depends on how fast things develop on the Moon.

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Mars isn't very Earth-like, but it is more so than anywhere else in the Solar System. Sunlight intensity is weak; not much more than half as much as at Earth, but enough for agriculture. At least the day/night cycle, instead of a month long as on the Moon, is just a bit more than 24 hours.

Mars's atmosphere is very thin, cold, and dry. At the surface, the pressure is about like 100,000 feet on Earth. It's far too thin to breathe or to grow plants in open fields. But it does contain oxygen (in the form of CO_2; the oxygen would have to be released by atmosphere processing) and just a little nitrogen. Most planetary scientists believe there is considerable water on Mars in the form of permafrost, but no one knows for sure.

In summary, everything is there that's needed to eke out an existence, but it will be a lot of work to do the eking out. The Moon, by way of contrast, seems to be essentially devoid of volatile elements like carbon, nitrogen, and hydrogen.

Mars has another problem as a settlement site. It's hard to get there, and it takes a long time. The space transportation energy needed to get to Mars is not all that high when the low-energy window is open, but it's only open for a couple of months out of every twenty-seven. Trip times vary, but are typically eight months. Imagine what the settlement of the Americas might have been if ships could have set sail only in June and July every other year and not arrive until the next February or March!

Of course, if someone would only invent high-energy space propulsion, we could go to Mars any time. If we have some sort of super engine that could deliver one g acceleration until halfway there and slow us down at one g the rest of the way, we could always travel between Earth and Mars in about two days.

Just what Mars settlers would do for export isn't clear either. One can imagine all sorts of exports from the Moon. It may take some tall imagining, but it isn't entirely incredible. The infrequent windows and long trip times to and from Mars, on the other hand, make it tough to invent a plausible story.

Mars may become the settlement site for people who want to "get away from it all." With enough technology and enough of a startup grubstake, Mars settlers could make it entirely independent of Earth. Complete independence is probably easier there than on the Moon.

And the O'Neill habitats? I cannot visualize government-funded programs to develop them, but the technology to build them will develop in due time. They will offer convenience and amenities not available anywhere else. Select your location, your day/night cycle, your climate, and your gravity level. Don't be cooped up in tubes under the Moon! Live in luxury with a cosmic view! Come see L-5's finest condos!

What a fantastic real estate development! ■

● When you have no basis for an argument, abuse the plaintiff.

Cicero

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Jay Kay Klein's biolog

Gordon R. Woodcock used to have time for sailing, glider flying, skiing, running, computers, and amateur astronomy. Now, writing and scientific pursuits take all of his time. Born and raised in Corvallis, OR., he lived most of his adult life in Seattle. An aeronautical engineering degree came from the University of Oregon, and a graduate degree in nuclear engineering from the University of Washington. That was back in 1965, when it seemed likely nuclear power would be used for spaceship propulsion.

His first article in *Analog* in July 1982,"You *Can* Get There From Here!" details all the arguments used against spaceflight ever becoming a reality; included was mention of the aborted NERVA nuclear-drive project. He had been working for Boeing on missile propulsion systems and for NASA on the Apollo program. Currently, he works on the NASA space station program in Huntsville, AL, designing materials the science space laboratory intended as the starting point for a new industry.

A second occupation is what may at first be thought a pastime, but is really part of his life's central obsession: Gordon is an activist member of the L5 Society. He has been on the Board of Directors nearly since its inception and President for the past two years. This is a real hands-on job, even cutting into his science fiction reading time. He had started with *Analog* back when it was called *Astounding*, and that was what turned him into a space enthusiast before there were any space programs. In a sense, he got himself educated specially to be among the pioneers in this technology.

He says that most truly imaginative people in the space business read science fiction and often write it. The mental stimulation is complementary to rigorous technical work. One thing he'd like to see are stories dealing with the sociological and economic imperatives that demand space travel, since the general public will have to be convinced of the need for initial expenditures without "immediate" returns.

In that first *Analog* article, he went over the many ludicrous arguments advanced by often highly credited persons arguing against trying to develop space travel. Much of the article is prophetic in light of recent developments. He cited Thomas Gold for saying that going to the Moon was too dangerous since it was probably covered so deeply by dust that Apollo ships would sink in it, never to be seen again. With the destruction of the Space Shuttle Challenger, Dr. Gold appeared on TV as an authority on why men shouldn't travel into space; his earlier dust-bowl warning was never mentioned.

Gordon's text based on engineering feasibility, *Space Stations and Platforms*, is being published around the time you read this by Orbit Books. ■

Gordon R. Woodcock

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...OBE...COPE

Never uncle... the power---o... ...of a ...bu...!

"Just three more forms," Worthington had told me, "and then you'll be ready to go." He'd neglected to mention that those last three forms would take two days to fill out. And I'd thought it would be easy. Oh, well. Soon enough all this would be far in the past. What was two days, after all, with ten millenia to go?

It was the morning of my thirty-fifth birthday. I was in good health, living alone, with no obligations, and independently wealthy. And totally bored.

Until the slump of '89, I'd been an electrical engineer working for Westinghaver Electronics. Jobless during the slump, I used the time between unemployment checks to work on a few ideas of my own. One of these ideas looked good: a new way to make an inductor on IC chips by . . . well, I suppose you wouldn't care about the details.

If I'd still worked for a company, I expect I'd have got a hundred-dollar bonus, a pat on the head, and a certificate from the company president saying what a good boy I was. Being unemployed, though, nobody owned the patent rights but me, so I fast-talked a bank out of a few hundred bucks, found my... ...to the patent appli... ...few percent cut, and hoped ...body else had thought of it first. Turned out nobody else had.

My baby, the "Haskell planar inductor," was a tad more expensive than the current technology inductors, so I didn't end up rich beyond my wildest dreams. But for one or two applications, Haskell inductors were better than cheaper inductors, and cheaper than better inductors. Mid-priced vidiphones, for example. I make a few pennies off every one. Not a fortune, but enough. When the slump ended, I could live off my royalties.

Sarah had divorced me the year before the inductor. She couldn't take poverty: she left me for a guy who had a job. I suppose I can't blame her. When she went she took our two daughters with her. Since then I've been living alone.

Sure, I had friends and acquaintances, but nobody I'd mind leaving. And I've always been curious. In my way, I'm a born tourist.

Back in 1995, hibernation hypothermia was a new thing, a medical curi...

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osity. It was mostly used to slow down a person's life processes for surgery, but occasionally used by people with incurable diseases and high hopes. Still, there was no reason a perfectly healthy person couldn't use it for a low-budget time machine. It took only a handful of drugs and a big refrigerator. When the refrigerator was turned off (or if the power failed) you woke up, without even a hangover. Neat, effective, and hygenic.

It's a one way trip. But after viewing the future, who'd want to go back?

Perhaps heading on a one-way journey into tomorrowland doesn't seem to you to be quite sane? Call it an obsession, then. Call it a neurosis, if you will, or delusions of grandeur. But long after you've been turned to dust, *I'll* still be walking around.

After sleeping for even a decade —much less ten thousand years —everything I knew would be long out of date. I'd be unemployed, like it or not. Patent royalties would roll in for thirteen more years. After that it would depend on my making wise investments. I put my money into a trust fund and hoped for the best.

Target: the year ten thousand. Who could guess what life would be like by then? Star travel, immortality, telepathy, perfect government by omniscient computers. Or maybe a desolated wasteland—but I had too much faith in the human race, foolish though we might be, to think that. We'd solve our problems, I was sure, and I would live to see it.

Once a century, I decided, I would wake up and spend three months in the world of mortals, acclimating myself to the future, finding out what had been happening while I slept the sleep of the gods. I wouldn't want to miss anything, would I? I would strobe through history at three months a century, living four hundred times slower than humanity. History would unfold before me like a grand and glorious pageant. Or so I thought.

I picked Lancaster, Pennsylvania as the site of my long sleep. Small enough not to be a target if there was to be a war, large enough to have a good library so I could orient myself upon awakening. I bought an old stone farmhouse outside the city, added a radioisotope generator for auxiliary power, and installed in the cellar a man-sized refrigerator with an automatic timer to shut it off at the right time. Then I was ready to go.

It wasn't that easy, as Worthington —my lawyer—explained. First, I needed a waiver from the FDA for permission to use hypothermia drugs. To do this, I had to obtain a license as a research institute, get permission to use human subjects (namely me), then fill out a form certifying that I had fully informed myself of the possible risks of the experiment. I also had to fill out various forms qualifying myself as nonprofit, assuring the state I wouldn't dump any hazardous wastes, and assuring the EPA I'd no impact on the environment. Not to mention OSHA forms, tax forms, safety inspection forms, and suchlike.

Actually, there was little risk. The process had been well tested before the drugs were released for medical use, though nobody had tried a "trip" as long as mine. The formalities wasted about six months, which I think I spent

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entirely trying to avoid newspaper and TV reporters.

In the autumn of 1995 I said farewell to my few friends and acquaintances. I consigned a set of keys to my law firm and one to my accountants. Finally I said goodbye to my two daughters, Pam and Susan, who had somehow managed to sneak away from my ex-wife to see me off. I would never see them again, and the parting hurt me more than I'd expected. But better to have one clean parting than an endless procession of court-ordered monthly visits, watching them grow up ever more distant, ever more alienated.

Then I ingested and injected and inserted the drugs, and lay down in my custom refrigerator for the first hundred-year leg of my eight-thousand year trip.

I woke up cold, and reached for a blanket before I realized where I was. I had a shadowy half-memory of dreams of ice, glaciers and snowfall and skiing on Alpine slopes. Then memory hit, and I shivered with anticipation as well as cold. 2095! What type of world awaited?

I opened my eyes. The lights were on in my small basement room, and two men in business suits were waiting for me. I looked at their suits first, trying to get my bearings. Not very different in style from 1995. Either men's styles had not changed, or they were trying to make me feel at ease by dressing in archaic fashions. The idea of a greeting committee wasn't unexpected. Surely I'd not been the only one to try one-way time travel. No doubt there was a standard procedure for greeting sleepers.

When I looked at their faces I got my first shock. One was unfamiliar, with dark hair starting to gray, and wire-rimmed glasses. That was a big surprise; I'd expected glasses to be obsolete as whalebone corsets by the time I awoke. But the real shock was seeing the second man. It was John Worthington, my lawyer! And he looked barely older than he had when I went to sleep. Anti-aging treatments? Or had he, too, become a sleeper? Inspired by my example? It would be only natural for them to use one sleeper to welcome another to the twenty-first century.

"Gentlemen," I said. "I presume you're here to welcome me to the year 2095."

The two of them looked at each other. Neither seemed to want to speak first. After a long silence, Worthington spoke. "Well. Yes. That is, no. Today is May 13, 2000."

"What? What happened? Is something wrong?"

"While the doctor examines you, perhaps I can explain."

"Please."

Far from sleeping for a century, my sleep had lasted not even six years. And I'd been awakened for the most trivial reason. Once a decade, one person out of a hundred is chosen by the census bureau for an in-depth interview. As luck would have it, for the year 2000, that one was me.

I was annoyed, then amused. What difference did one extra awakening make? I had eighty more to go on. And as an added bonus, I could sightsee the beginning of the new millenium. 2000! Suddenly I was irrationally vexed that they'd wakened me too late to see the greatest new year's celebration of all time.

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After a few weeks the novelty began to pall. 2000 was depressingly like 1995. The only thing I found worth seeing was the latest women's fashions. The current fad featured almost complete nudity, with elaborate and fantastic body paintings to reveal and conceal the feminine form. A new type of paint allowed the skin to breathe, and was electrically heated to allow near nudity even in winter. Few men wore it, though, and the ones who did were considered rather suspect by the rest of society.

My daughters had grown. Pam, thirteen when I'd left, was now married. Susan, only ten when I left, was thinking about college. She wanted to be an engineer. A chip off the old block, I thought. Much of the old hurt from the divorce had melted away, and I felt closer to them than I ever had. I was sorry to think that they'd both long be only memories by the time I next awoke.

My patents were doing well, better than I'd expected. Haskell inductors were still only used in one electronic product out of a hundred or so, but there were an awful lot of electronic products. I was making about fifty million bucks a year. But, then, fifty million wasn't what it used to be. The patents would expire in about seven years, so I was just as glad that I could make the bucks while I had a chance. Before I went back to sleep, I had another go-around with my lawyers, trustees, and executors to ensure that my money would stay intact when the royalties cut off.

After a month in the year two thousand, I slept.

* * *

I tried to pull the covers over myself and go back to sleep. Damn! Having awoken from hypothermia once, you'd think I'd have had enough sense to provide covers this time. Was it 2100? I opened my eyes and saw Worthington.

"Good morning, Mr. Haskell."

I sighed. "If you're going to show up in my bedroom, you might as well call me Jason. What is it this time? Earthquake? Flood? The 2010 census? What year is it, anyway?"

"It's May third, two thousand and seven. Why don't you get some breakfast, and we'll talk while you eat."

That sounded good to me. In case I didn't mention it, hypothermic sleep requires an absolutely empty stomach. First, you fast for twenty-four hours. I was famished.

While he talked, I ate like a man who'd last eaten seven years ago. The year before my US patents expired, a team from Westinghaver Electronics discovered a new process to make inductors on IC's. They claimed that the new process was sufficiently different than mine as to not be covered by my patent. My lawyers claimed otherwise. "Westinghaver really doesn't have a case," said Worthington, "but they have the right to subpoena you as a witness. They're betting that you won't testify, and they'll win the case by default." About a half billion dollars worth of royalties were at stake.

"Of course, a billion dollars isn't worth what it was worth when we were kids," he said, "but it still is a rather large sum. We were forced to awaken you, despite your instructions not to be disturbed, quote, 'for anything less than the second coming,' unquote."

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At this point it was all Monopoly-money to me, but I refrained from saying it. I could imagine it might be rather important to the outside world, which didn't take such a long view. I asked him what the inflation rate had been, then translated back to 'real' dollars. Just over a quarter of a million, give or take a little. I sighed.

Still, 2007 was a nice year to visit. Body paint was now the leisure dress of both sexes, at least among the younger people. Children below puberty mostly went completely nude. The first fusion power plants had just come into the electric grid, and cities were again sparkling jewels at night, a welcome change from the dark cities of the 1990s. More important, space exploration had begun again in earnest, using electromagnetic cannons to loft supplies and building materials to orbit, leaving expensive space shuttles for people only. I asked if it was possible to go into space as a tourist. Regrettably, though, space was still a government monopoly, although a lot more governments were now involved.

The next awakening it would not be, I hoped.

My daughters were both doing well. Pam had a couple of kids now, and Susan was about to graduate from college. The age gap which separated us had shrunken considerably, and I felt very close to them both. But my goal called. I stopped long enough to replace the obsolete 1994 drugs with the new generation drugs and fill out a few new government forms, then went to sleep.

I awoke with Worthington waiting.

"What is it this time?" I asked. "And how long have I slept?"

He explained as I ate. Patents again. The Malagasy Republic, a large industrial nation in East Africa, had a new policy of encouraging technical innovation. Part of this extended patents to a fifty year term. This included old patents—if the inventor personally requested the extension. I sighed.

"I thought I'd given instructions—"

"I know, I know," he said. "Hell, Jason, you don't think that waking you up was *my* idea, do you?"

I found out that while I slept, I was only marginally in control of my money. The trustees and investors who actually controlled it had a vested interest in making sure it continued to grow, and even had the legal right to countermand my direct orders.

In 1995, the Malagasy Republic was the island of Madagascar. In 2009, due to the equatorial mass driver, it was fast becoming one of the richest nations on Earth. It extended from what was once Kenya to what had been South Africa. Yeah, it was important enough for them to wake me.

Susan was working on her Ph.D. now, but wasn't too busy to show me around. All in all, though, 2009 wasn't as nice a year as 2007. There was a new cold war with the Brazillian empire over legal rights on the Moon. Space travel still wasn't open to tourists. And the latest fashion for both sexes was brightly colored, but shapeless, coveralls, which had no appeal at all. Before I went back to sleep, I made new arrangements with my trustees making sure I wouldn't be awakened again. If I had to, I'd travel to the year ten thousand penniless. If

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they woke me for every patent squabble for the next fifty years, I'd never get there at all!

When I woke again and saw Worthington waiting for me, I almost decided to commit murder and go right back into hibernation. Only the thought of how a murder trial would delay my journey stopped me; certainly any jury would call it justifiable homicide.

Of course, it wasn't his fault. Like the census, the Internal Revenue Service audits people chosen at random. I didn't know a damn thing about my finances, but that didn't stop them from having to question me in person. I asked Worthington whether I could be declared legally dead or something. No go.

Susan got her Ph.D. that year, and we had a small party to celebrate. The cold war with Brazil was in its third year, and the ambiance was still rather depressing. At least the ubiquitous coverall suits were now form fitting.

They woke me again for the 2010 census. That year the entire population of the US was being interviewed (by computer, of course). Many of the questions made no sense ("Do you engage in uldorization? How often?"). I answered as best I could. Worthington assured me that it was a surprise to him, too. For the census of 2020 he would get me a waiver. I spent a few days filling out government forms and went back to sleep without even sight-seeing at all.

One factor in my chosing Lancaster as the site for my trip was the fact that they had a relatively new nuclear power plant, providing a reliable power source for at least the near future. When they woke me in 2011, I found I'd made a mistake. The aging power plant had blown a collywobble (or some such thing), and was in imminent danger of melting down. Lancaster was being evacuated.

Later, it turned out the whole thing had been a false alarm.

Still cold war. I spent a week visiting Susan, who was starting a new job in Cambridge, then went back to sleep.

In 2012 they woke me for a practice evacuation, just in case. I suppose it was just as well, since I had a new bunch of government forms to fill out. If I hadn't been awakened then, they would have woken me for one reason or another anyway.

My daughter Pam was now thirty. Her children treated me with awe. Susan had a career I could be proud of: she was a design engineer on a project to develop a reliable fusion rocket engine. There was finally détènte between the US and Brazil, and the atmosphere seemed very friendly. I thought about staying for a while, but figured there would be plenty of chances to spend time in this century before the government straightened out its bureaucracy and let sleeping sleepers sleep.

I was right, since they woke me up again in November, barely five months later. Turned out they'd passed a law making it a crime *not* to vote in a presidential election. I shuddered at how waking up every four years would slow down my trip. The political parties were "DemRepublicrats," "Neo-Nationals," and "Spixies." I let Susan tell me how to vote.

Worthington assured me that a bill, now in Congress, would exempt from

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the voting law hibernators, members of minority groups, and persons not registered as members of a major political party. That made no sense to me, but then, what did?

They woke me again in 2014, and I seriously began to wonder if there was a government conspiracy to pass new laws to annoy me. To solve some imagined fiscal crisis, the government had finally abolished money. Most citizens already had universal credit cards, and hardly noticed the change. I'd never gotten one on any of my previous wakenings, since I always figured I was just passing through. Now it was required. They took my signature, fingerprints, retina patterns, a blood sample, and a psychological profile to find out how well I could be trusted to pay my debts. All unnecessary, of course, since I left 2014 as soon as I possibly could. I stopped over just long enough to look into the feasibility of emigrating to Africa. This turned out—of course—to involve too much red tape.

Later in 2014 they woke me for a compulsory medical exam, part of the new compulsory health plan.

In 2015 they woke me for jury duty. After three days I was dismissed. No lawyer, neither defense nor prosecution, was willing to risk picking me for a jury.

Later that year they audited my income tax.

In 2016 they woke me to vote on a national referendum about whether to declare war on Mexico. I had no idea what was going on. Susan told me to vote no, so I did. She was now the chief design engineer for the fusion rocket program, which was going "spectacularly well," she said. Other than that, 2016 was another dull, depressing year.

Later in 2016, I had to testify about one of my accountants, who embezzeled a hundred million of my assets and fled to Tahiti. I'd never met him. I expect they regretted waking me to testify, since I told the court that I really didn't give a damn.

Still later, I had to appear before the draft board to explain why I hadn't registered.

They audited my income tax again in 2017. Later they woke me to tell me that hypothermia drugs caused cancer in gibbons (that's right, one in ten thousand), and that I needed a new informed consent statement. Still later that year, I had to take a loyalty oath to United North America. I asked Susan whether that meant we'd lost or won the war with Mexico. "Both," she said.

In 2018 it was the population bureau, the social security administration, the IRS, the EPA, and a bomb-shelter drill. Being a citizen of North America, rather than the old USA, didn't change the bureaucracy in the least.

In 2019, I needed a new consent statement; the old one was invalid. Later it was new ID cards. Later yet they woke me to be interviewed by a talk show. (Yes, in 2019 the media wielded enough power to do a lot of what we used to call "invasion of privacy.") And another evacuation.

Five times in 2020. Six times in 2021 and 2022. I made a quick calculation. If they woke me an average of six times per year, and each time took on the average four days, it would take me five hundred years to get to the year ten thou-

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sand. I'd never make it! Besides, my arm was beginning to ache from all those injections. Something had to be done.

It was now quite clear that if I ever wanted to get to the year ten thousand, I'd have to go into hiding. I would have to exist outside the government's sight. Already I could see how that would engender all kinds of problems. I would awake without citizenship, without support of any kind. That looked like a prescription for trouble, at least for the near future. It was time to make some hard decisions.

Did I want to continue at all? I'd left 1995 with nobody to regret my absence. Strangely enough, here in 2022 there was a handful of people I was close to. John Worthington, who'd protected my interests so vigilantly during my sleeps. Pam. Susan. They were my age now. How many parents ever got the chance to meet their children as equals? My divorce, so recent for me, to them was almost forgotten. Through them, I too had finally learned to think of it as ancient history. Pam had a family of her own, children who treated me like a rather eccentric, but still lovable, uncle. And most of all, I would hate to leave Susan. She'd grown up to be a hard-headed, no-nonsense woman; someone I could talk to.

But did I really want to settle down for good in 2022? Oh, there were good things about 2022, for sure. But it seemed like the government here was totally nuts. I suppose that was just as true of '95. Or of any year, for that matter. But at least the craziness of 1995 was craziness I was used to.

I thought it over, over and over, but couldn't decide. Stay? Or keep going?

When I brought it up with Susan, she suggested yet another option.

"I've told you that our work on fusion engines has been going pretty well," she said. "I guess I haven't told you quite how well. They've been keeping it close, but it'll be announced next week. We're building a starship, a fusion-powered interstellar explorer. We've been designing it for the last two years. It'll be slow, sure. Traveling at one percent of the speed of light, it'll take twelve hundred years to get to our target. With hypothermia, that's not necessarily a real problem. But we've got to find five hundred people, bright, competent people, prepared to deal with anything, and willing to leave behind their lives here, to take a trip with the earliest return more than two thousand years from now.

"I'll be chief engineer.

"And we're looking for volunteers. . . ."

It didn't take me long to decide.

So here I am. Just one more form to fill out. A "short explanation of my reasons for joining the starship project." Hmmm. How short is short?

As soon as I finish writing, I'll take my drugs and get loaded onto the shuttle. Sure it's a bit of a detour, but I think it's the only way to get to the year ten thousand.

And the best part of it is, there's no government where we're going. No IRS, no social security, no census, no Loyalty Bureau. We're leaving it all behind.

A.D. ten thousand, get ready. Here I come.

Just as soon as I can finish this form. . . . ■

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on gaming

Matthew J. Costello

Ah, the allure of time travel. Whether it's a quick hop to check out tomorrow's winners at Hialeah, or a heroic venture to the past to change history, we all could think of our own special use for a time machine. But a moment's thought usually brings to mind the many weird paradoxes that are part and parcel of any dream of time travel.

Games have often tried to capture the elusive flavor of time travel, with Pacesetter's *Timemaster Role-Playing Game* being the most recent and successful attempt. *Timemaster* created a future world of time agents who use their chronoscooters to fight the sinister meddling of the Demoreans. The Demoreans, four-armed beings who can mimic human appearance, seek to disrupt history on the various time parallels that make up what's called the "continuum," and thereby gain control of all time.

It wasn't exactly everyone's dream of a time travel adventure game, with its oddball aliens trying to kidnap Queen Elizabeth I and a Time Corps made up of adventurous souls recruited from the Cro-magnon Era on up. But it was a well designed role-playing system, supported by an assortment of amusing modules.

Now Pacesetter has released *Timetricks, A Survivor's Guide to Time Travel* (a 96 page supplement for Timemaster; $10.00), and time travel has just got its first reference manual and travel planner.

Timetricks is the Advanced Training Manual, the "Timetricks Program," for the Time Corps. In an "All right you guys, gather 'round" tone, the book proceeds to deal with a dizzying array of mind-tickling possibilities. First there's some hush-hush information about the Demoreans, including details of their nefarious objectives. Of course they seek the destruction of the Time Corps, but they also want to establish totalitarian states on all the parallels (a parallel being one possible strand of events in time). The Nazi regime, we're informed, on our parallel T-0 was a dream come true for these sweethearts.

But the manual is a guide to using time travel to its fullest, and avoiding the ever-present logical conundrums. For example: You, as a Time Corps agent, learn from a renegade Demorean (call him "Al") of something the Demoreans are doing in the past to mess up one of the parallels. So you hop on your chronoscooter, and head back to that time. When you get there you discover the Demoreans, a battle ensues, and the renagade Al is killed. How, then, do you learn of this event in the future if there's now no Al to tell you? See the problem? Well, fortunately the Time Corps has learned that no hop "pastwards" is ever eliminated by its own consequences (in most cases, that is). Remembering, after all the dust has settled, just why you came to the past

(continued on page 127)

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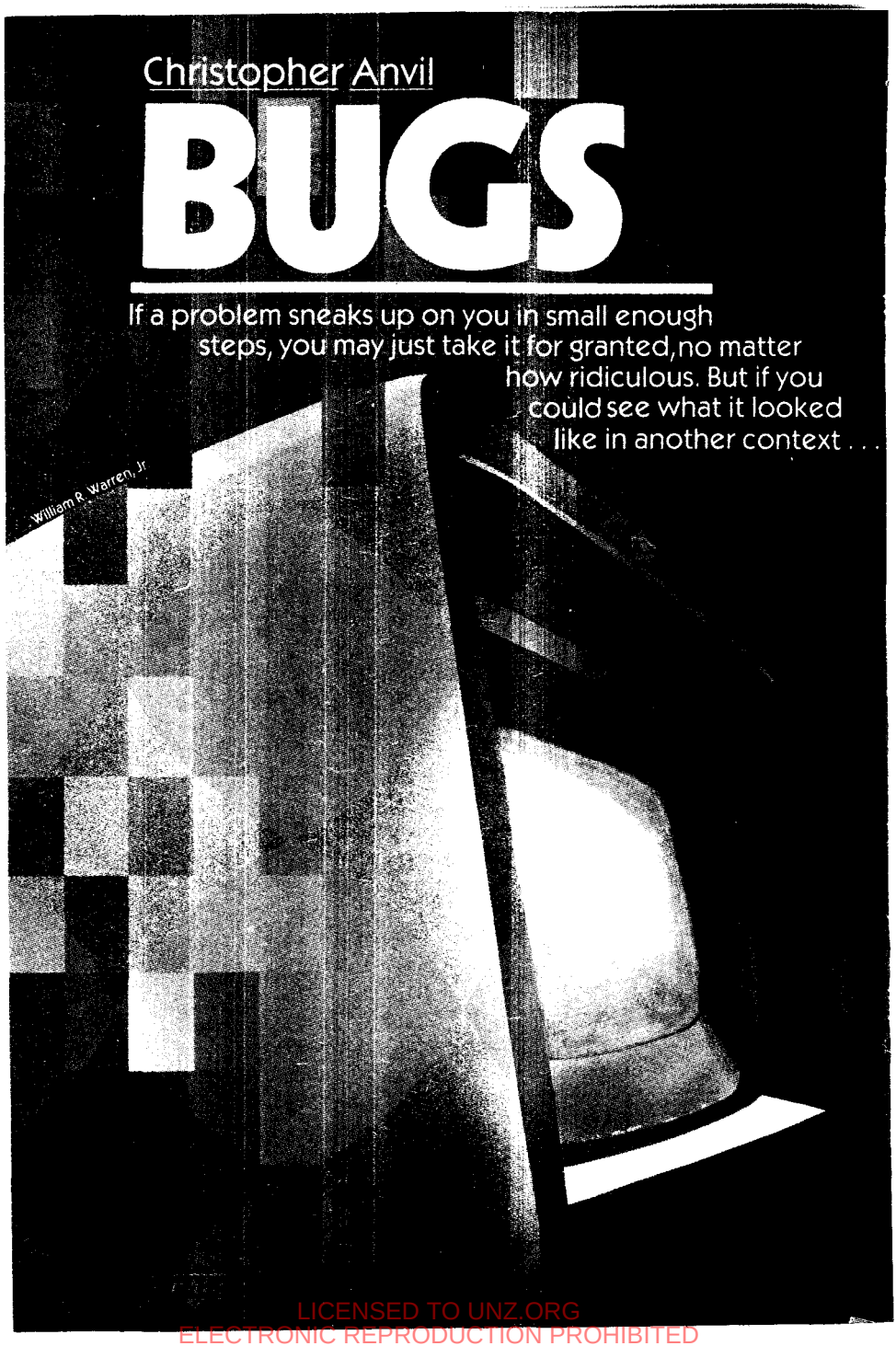
Christopher Anvil

BUGS

If a problem sneaks up on you in small enough steps, you may just take it for granted, no matter how ridiculous. But if you could see what it looked like in another context . . .



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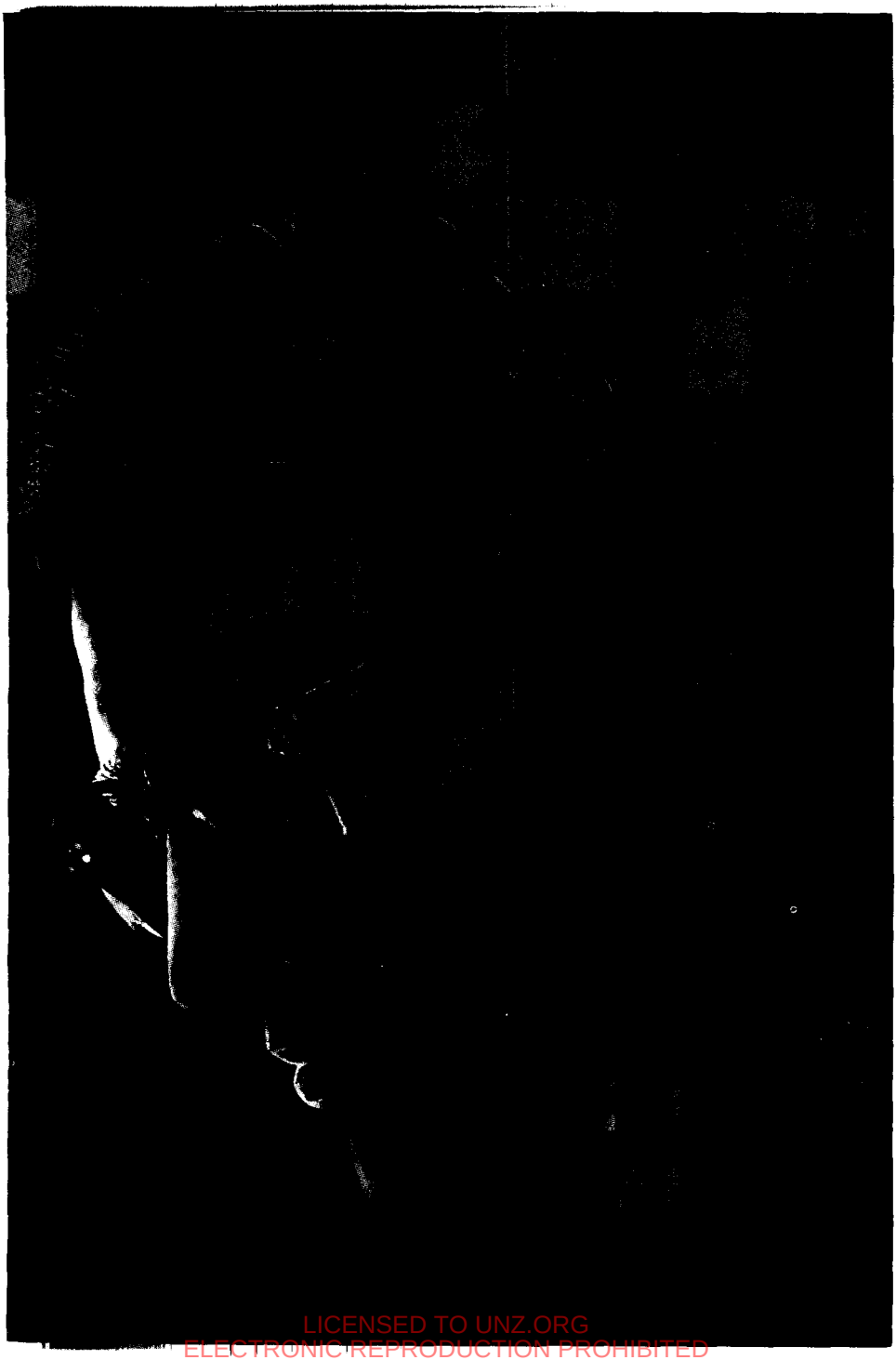

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Randy Pratt, under the hanging ad lettered "Sharke Computers," looked down pityingly on the woman customer standing clench-fisted by the showroom door. Because of the glare of the morning sun on the windows of a car parked outside, he had a little trouble even seeing her. But he strained hard to be fair.

"If," he said, locating a business card in his jacket pocket, "there is anything we can realistically do for you, just get in touch with me. But what you're asking here is not realistic. Now, I hope you'll excuse me. I am speaking shortly at the seminar." Randy favored her with a conversation-closing smile, and handed her his business card.

The customer ripped the card across three times, threw the pieces on the floor, and went out. The automatic door closer shut the door gently.

Randy exhaled, murmured, "Cretin," and picked up the pieces. He went around back of a software display to the wastebasket.

Across the room, Mort, the part-time salesman, came out from behind a display of desk, portable, and lapsize computers. "What's her problem?"

"Oh, she bought a Sharke Superbyte here a few weeks ago. Now she's got a Shomizota printer with a serial interface, I suppose from Barricuda Byte Shop. Naturally, she doesn't know a bit from a detachable keyboard, so she figures it's our job to mate the printer with the Sharke."

"Stupid. But that Shomizota's a sweet little printer. You can't blame her for getting it."

"Naturally, I don't blame her. It's cheaper than ours, you don't have to be a weightlifter to move it, and people don't run for cover when it prints. The problem is, who's going to get it working for free? It's standard with the Barricuda. Of course, the Barricuda—"

Mort looked knowledgeable. "Oh, it's not so bad."

Randy stared at him. "It's got the reset button next to the left-hand shift key. And the keyboard's got an extra-light touch."

"It's a fast keyboard."

"I saw a guy demonstrate the Barricuda, with a big crowd around him, and about halfway through he accidentally bumped the reset. Everything on the screen disappeared. Then it lit up with, 'KINDLY INSERT YOUR SYSTEM DISK IN DRIVE A.' You like losing everything you've done because you bump the wrong key?"

"There are—ah—one or two bugs—" Mort glanced at the door. "I'll straighten the magazines." Randy glanced around.

Through the glare appeared an unshaven, strongly built man wearing a sweat-soaked T-shirt. His left hand flung open the door. His voice was rough.

"Somebody here named Curtis?"

Randy quickly thrust out one of his cards. "Mort, whatever became of Curtis?"

Mort's voice came from back of the magazine rack.

"Working over at Wolfe Computer, the last I heard."

Randy nodded and turned back.

"Wolfe Computer is out on Industrial Way. You take a left, just up the—"

"He was working here when he sold my kid a Gnat computer. When it quit, Curtis says you can't fix it, the company's broke."

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"Well, I'm sure Curtis—"

"It's the store's guarantee. When do we bring it in?"

"Well, I—I'm not quite sure of our policy on Gnat repairs, and—"

"Don't hand me that."

"Sir, I'll tell you what. The store manager is out today. He should be in tomorrow morning around eleven."

"I'm working at eleven."

"Then I'm afraid I don't see—"

"I'm here now."

"There's—"

"The kid worked all summer to buy that Gnat. You're going to fix it."

Randy glanced at his watch. "Mort, will you take care of this? I have to get over to the seminar." Mort's disembodied voice said miserably, "What can I do?"

Their visitor glanced around. "The thing is guaranteed, Buddy. You can fix it."

Randy stepped behind the long counter with its software display, featuring dragons, dwarfs, chests of gold, spaceships belching fire, competing captains of industry shaking their fists at one another, columns of stock prices, charts, graphs, tax forms, spreadsheets—and then he was going down the hall past a door with a window beside it that looked into the repair shop, where a technician in gray laboratory-style coat beckoned urgently. Randy stepped in, closed the door tightly behind him, and nodded.

"Mike. I'm just headed for the seminar. I have to give a talk on—heh—The Future of Computing."

"Who's that out front?"

"You remember the kid that bought our last Gnat computer? The kid that knew all about processors, operating systems, machine code, assembly language, higher level languages—you name it?"

"I remember him."

"Stewart guaranteed the Gnat for ninety days. That's the kid's father out there."

"Randy, that Gnat was full of bugs!"

"I tried to tell Stew—"

"That's the sixth one to come back on us. You almost need psychic powers to even get into the case without wrecking something. Once you get inside, there's stuff labeled 'Made in Sarabanga.' I can't find anyone even knows where that is. Not to mention there's eighteen little screws that hold down the cover, and all those screws are soft."

"I guess the margin was such—Look, I've got to be going."

"Who's talking to the kid's father?"

"Mort is—ah—trying to calm the storm, and—"

"Mort? That wimp! Look, Randy, I'm better than two weeks behind, thanks to that Gnat guarantee. I can't keep up, much less honor this 48-hour fix you guys are offering. Get rid of this guy! Three of them came in a few weeks ago, and Curtis ran them out. Randy, if you've got to sell junk, that's your business. But I can't fix all this stuff! I didn't plan on a big scene, but you've got to know there's a limit!"

"I know. I know how it is, Mike." Randy sighed. "I never dreamed—" He paused, shoved his thoughts back on the track, and groped behind him for the doorknob. "I'm sure Mort will—"

A newly familiar voice echoed down the hall: "Twenty-one day guarantee, hell! I've got a copy of your ninety-day

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guarantee right here. The original's in my lawyer's office! Now, you going to make this right, or—''

Randy slid out into the hall, walked fast, stepped outside, and paused as the heat of the asphalt parking lot hit him. He opened his car door, staggered in the bake-oven blast, peeled off his jacket, and began to mentally review what he would say at the seminar.

Randy, two hours later, stood, chilled by the air-conditioning, before the blank-faced attendees of the Sharke Computing Systems Bienniel Free Seminar on Home, Professional, and Personal Computing. He concentrated on the speech's conclusion:

''In conclusion, as you will remember, we have discussed the factors of density of circuit elements on the chip, number of chips to the system, architecture, assembly and machine-language programming, LSI and VLSI, higher level languages, operating systems, and applications programs. The improvement in all of these factors must be understood to truly appreciate the change that is rapidly overtaking us—the change to a Fully Computerized Environment, or FCE, as we may call it.''

He smiled. If anyone in the crowd smiled back, he didn't notice it.

''I am sure,'' he finished, speaking the hopeful lie that had the virtue of tying things up and ending on a note of optimism: ''I am sure everyone in this audience today will enter the FCE willingly, and will successfully ride the wave of the future.''

There was empty silence, then a thin scattering of applause. Then, as people sat up, perhaps jarring others awake, the applause briefly strengthened. Then there was a rush for the exit.

Randy looked on moodily. ''If there are any questions—''

The room continued to empty. Well, now he had to get back to the store. Hopefully, Mort would have outlasted the indignant father. That was the thing, he told himself—outlast the opposition. Maybe then things will start to look up again.

Once parked behind the store, he got out onto the familiar soft asphalt, let himself in, and listened alertly. There was a murmur from somewhere. A furtive glance showed Mike, the technician, hard at work.

Up front, Mort was speaking hesitantly. ''I can see this new program might be revolutionary, but I'm not quite sure we could sell it. I mean—''

''Oh,'' said an unfamiliar voice, ''everybody will be going for it. Of course, I could take it over to the Sharke compatibles first. Or—''

Randy stepped around the counter, and held out one of his cards. Their visitor promptly held out one bearing the name of the company, ''Armagast Software.''

Mort looked at his watch. ''Well, about time for me to go home.''

Randy said, ''How did it work out with the—ah—the boy's father?''

''Stew came in after you left, and agreed to fix the Gnat. Then after the kid's father left, Stew blew up and said you and I should have gotten rid of him. Then he claimed Curtis should never have sold the Gnat to the kid. Next he said it was your fault we ever stocked the Gnat in the first place.''

''Me?''

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"He said he relies on your technical judgement."

"I told him for bugs the Gnat was an ants' nest! He said the margin was fifteen percent higher than the competition. Now he blames me?"

"I'm just repeating what he said. I thought you'd want to know. Well, see you on Tuesday."

Randy glanced at the avidly listening salesman. "I'm not sure we need to add anything to our line. Who did you say wrote it?"

"Armagast."

"Armagast of Armagast Software, not Armagast of Future Designs?"

"Same person."

"What's the program?"

"A problem-solving program. Very unusual. I could say revolutionary. You'll understand if you've heard of Armagast."

"Have you run it?"

"I—ah—It's so new—"

"How much?"

"Only two hundred fifty. A bargain."

"I'll take one for the store, and one for me personally."

"And your personal computer?—What make?"

"Well—I have a Model 3 Cougar."

"No problem. We could supply ENIAC, if it had disk drives."

It took Randy a moment to remember that ENIAC dated from the forties. He could feel his cheeks burn, and was still mad after he was home, settling down at the Cougar's keyboard, his wife watching worriedly.

"Randy—I hope that's a disk you borrowed from the store."

"Since when did the store stock anything for Cougar?"

She hesitated. "How did the seminar go?"

"Horrible."

"Hard questions?"

"They didn't ask questions. After I got through, I guess they figured they'd never understand. And at the store—Well, we had a woman who wanted us to interface a Barricuda printer to her Sharke computer, and if my guess is right, next she'll want to run a program set up for something else. Then we had a guy whose kid bought a Gnat from us, and it's dead already, and Mike, our technician, is swamped, and then there was the lecture, and finally—let's see—" He brightened. "Then there was a software salesman, and he had this program."

"What's the program?"

"I'm not sure. It's supposed to solve problems."

She hesitated. "How much was it?"

"Two-fifty."

She looked at him.

"Two hundred and fifty dollars?"

"Plus tax. So now I'm guilty."

"You don't know what it will do, and you spent two hundred dollars for it?"

He got up carefully, stepped to a table separate from the table holding the computer, and brought his clenched fist down on the table.

"A call went out a while back, remember? It said, 'The future is computers. Anyone who wants to earn his keep should study computer science.' I don't mean to make a federal case out of it, but I did do the work and I did earn the piece of paper. And now how do I spend my time? Answering the

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same questions over and over, wrangling with customers, trying to suck people into buying when for all I know it will ruin them, and, to vary the monotony, I get to deliver lectures to people who think Sanskrit while I talk Greek. We were headed for the Moon! How did we end up in this swamp? Do you know how many companies are going broke, and what the rest are doing to stay afloat?"

"I just know I can't hold a job and at the same time be in the hospital with a baby. And I can't go right back afterward. If the job is even there."

"I know. But the dream is dying! Why?"

She looked at him, frowning. "At least you do have a job."

"Thanks. I know what it is."

"But, Randy, why did you spend two hundred dollars? We need it!"

He sighed. "Armagast wrote this program."

For just an instant, he thought the room wavered. She stared at him. Then, for some reason, she came over and kissed his cheek.

He looked at her blankly.

"Okay," she said. "But please, Randy, don't get another program —unless Armagast wrote it."

"I didn't know you knew about him."

"I don't."

"He wrote Control—it's the operating-system for the 99000. He's one of the giants. They drove him out of business for a while. But he's still fighting. There are rumors he's coming out with a new machine that will beat them all."

"Maybe that's why the prices are being cut? And the dream—"

"No. As long as he's there, the dream's still alive. And this is his first program, so far as I know, since Control!".

She nodded uncertainly. "All right. You go ahead. When you're through, I'll get you something to eat. I hope the program won't disappoint you."

He looked after her, puzzled. The money was still spent, wasn't it? And she was right, they did need it. He turned back, frowning, to the computer, ran his thumb affectionately across the stylized chrome cougar-head design with its big curved fangs and the horrible motto: "We Byte." He slid the disk in, listened to the familiar hum-rumble-clunk, waited, and then the screen lit with a swirl of curving lines as if he were falling into a whirlpool.

SOLUTIONS

by

Armagast Software

There was a dizzying pause, and then successive lines of print flashed onto the screen:

"This is not a problem-solving program.

"This is a program to help speed your solving of problems.

"The mind is in many ways the most practical problem-solving device.

"What it needs is facts. We will assume you have the facts, though you may not be aware of it.

"What it needs is concentration. We will strengthen that concentration.

"What is needed is to see the possible combinations of facts that, as they join and rejoin in all conceivable patterns, occasionally offer practical solutions.

"The program you are about to experience makes use of certain as yet

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unappreciated aspects of the nature of microprocessors and of the human brain and the human mind.

"Because this program involves factors which may not be fully understood, you should, BEFORE you run this program, carefully read our Customer Agreement. This may be informally summarized as follows:

" 'We are legally responsible for nothing whatever, in any way whatever, related to your running this program, or for any consequential damages resulting therefrom. You are fully and inescapably responsible, from the moment you tore the plastic wrap, for anything and everything that happens afterward, anything to the contrary notwithstanding.'

"However, please do not rely on this informal summary. Read the Agreement. It is much more detailed and restrictive.

"If you wish, you may stop here and return the program for your full purchase price, less a slight charge for repacking. To return the program, type 'R' on the keyboard. To continue, type 'C.' To think things over, or reread the Agreement, WHICH MUST BE READ FIRST, type 'P' for pause."

Randy sneered, and hit "C" on the keyboard.

Gently at first, the screen seemed to swirl. He felt a moment's dizziness, and then the words that flashed on the screen appeared to transmute into a deep thoughtful voice:

"Too often, we overlook the obvious when we try to solve a problem. We should look the problem over very carefully, note the exact details, note how the details are related, and not hesitate to use paper and pencil. Be sure you know what the problem is. Possibly there is a similar, simpler, or more familiar problem to use as a model? Can you . . ."

The voice went on, each suggestion somehow compelling a thought-out response, and the effort of each response creating a kind of mental jolt so that he felt dizzy, as if successive blows sapped his strength. He was still struggling to put his problem into words—"What's happened to the dream?" when everything seemed to fade out.

"Randy—" The feminine voice was gentle.

"Whew." He sat up dizzily. The room spun around him. "How long—"

"I just came in to tell you good-night. You were slumped over the machine."

He massaged his forehead.

"Well—If that's Armagast's latest—I hate to say it—Maybe the dream *is* dead!"

"Oh, don't say—"

"It's junk. A little advice and a feeling like some stage hypnotist just tricked you into dancing around with a broomstick."

"Maybe it will seem better in the morning."

"I'll see if I can get my money back. I'm afraid it's too late. But the store copy goes back tomorrow, as soon as I get hold of Stew."

Stewart Rafer pushed up his thick-lensed glasses and eyed the package as Randy, hand pressed to forehead, described the program.

"—and you should have seen the disclaimer in the program itself—which is supposed to be just a mild summary."

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Stewart was studying a large paper covered with fine print.

"I just wonder—This whole thing gives me the impulse to see if I couldn't crack their little gimmick. What are we, the auto industry?"

Randy looked blank, then went on, "What makes me sick is Armagast. I can't believe he did this."

"Well, they get zilch for this package from me, and I'll lean on them to give back what they got from you. Not that we can count on it." Stewart glanced at his watch. "Now, I've been thinking we could give better service if we could pick up machines for repair, and bring the finished job back to the customer. One of these multiformat vans might answer our needs. But I'd like your opinion."

"What's—"

"Tell Mort you and I are going out, and we'll be back about four, at the latest."

"Is Mort in today?"

"Should be. I told him to come in."

Randy stepped down the hall into the showroom, told Mort, and then stood still a moment, considering that:

a) Stewart had not exploded at the purchase of the Armagast program.

b) Stewart was going to try to get Randy's money back.

c) Stewart had hired Mort for an extra day's work, so Randy could go along to look at the new van.

Not once in the past had Stewart treated Randy so much like an equal. And here was Stewart even saying that he would like Randy's opinion.

On top of that string of impossibilities, there was what Stewart wanted Randy's opinion on—a "multiformat van." What was a "multiformat van"?

Then there had been that about "cracking the gimmick." Apparently Stewart wanted to unlock the tricky antipiracy traps in the Armagast program. When had Stewart ever shown interest or talent for that?

In short, something was wrong. If this was reality, Randy didn't recognize it.

Of course, it could be just Stewart. Maybe Stewart was coming down with a cold, and this was how it hit him?

But then he realized there was a worse inconsistency:

Armagast.

Even when the big companies drove him to the wall, Armagast had still paid off his creditors and delivered the goods to his customers. That was one reason for the fanatical loyalty the man inspired, for the users groups that stuck with outdated Armagast hardware, for the rejoicing when the Armagast updates began to come through, against all predictions stepping up the power of the Armagast machines. Even the announcement, mailed to former customers:

"Armagast Computers is happy to offer our former customers the renewal of all services we formerly provided. Effective immediately, we also renew all Armagast warranties for a period of ninety days from the date of this letter. We offer immediately a series of upgrades to make our computers fully comparable to our competitors. We thank our customers for their loyalty, and we continue to stand by our pledge: 'Solid quality at a fair price.' "

Would the individual behind that have put out a program that didn't work?

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It was at that point that Randy became conscious of a ghostly wind on the back of his neck.

No, the Stewart he knew positively would not act as Stewart now was acting.

And, no, Armagast flatly would not do as Armagast apparently had done.

Therefore—

From down the hall Stewart called, "Okay, Randy, let's go."

Randy swallowed. "Coming."

Stewart held the outside door open.

Randy stepped outside, to stare at a dirt parking lot where the high wheels of parked vehicles rested in narrow concrete troughs. The troughs curved in pairs, their tops a few inches above the muck, out into a road where they alternated with mud puddles under buzzing swarms of flies.

"Merciful God," said Randy.

Stewart growled, "Which of these heaps do we take?" He pulled open the door, and leaned back into the building. "Hey! Mike?"

The technician's voice was muffled, "Stew?"

"Randy and I are going to look at a van. What's the format for Inter-Continental Motors?"

There was a click of a door opening.

"InterCon? Wide and deep. But hey, Stew, wait." Footsteps hammered down the hall, and the technician peered out into the sunlight. "The format's about sixty by eight, but don't take an adjustable. I've found out InterCon's latest little stunt, just by accident—and I do mean accident."

"What—?"

"They've raised the roads under their overpasses."

Stewart stared.

Mike nodded. "I saw one of those adjustable vans that's supposed to fit any format start under the overpass going in on Main Street. The top of the van hit the underpass. There was glass all over the road."

"They can't do that!"

"They can if they make it legal."

"What happened to the van?"

"A big InterCon wrecker slid under the overpass with inches to spare, and hauled the wreck out. An ambulance took the driver. That was an InterCon job, too."

Stewart shook his head. "Half the outfits using InterCon's format will start to collapse when news of this gets around. But how do we know which ones?"

Mike glanced around the lot. "Yeah. We don't want to get an orphan we can't find parts for. Well, all I can offer is, drive the InterCon job. It may be slow, but you won't spend half the day dodging underpasses."

"I was thinking of looking at one of the independents first."

"Then make two trips. But I tell you, Stew, I'd hesitate to get a van that won't go into InterCon's territory. They're big and getting bigger."

"A lot of our customers don't live there."

"Do you want to be driving a competing van when they throw the next block into the competition?"

"No. But there's an InterCon price list on my desk, stuck under the appointment pad. Take a look at that."

"That's how they play it. Well, enjoy yourself out there. Happy disposition!"

Stewart nodded moodily, and glanced

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at Randy. "Let's see what InterCon has to offer while we're still fresh. I'm not sure I can stand their van salesmen after ten in the morning. Then we can look at some independents, and if we've got any strength left, we can try Rugged Jake."

Randy drew a shaky breath, and nodded. He glanced up. The sun and clouds looked the same. The trees looked like trees he had known before. The buildings looked unchanged. Then he looked back at the mud, the curving tracks, and the clouds of flies. Only one explanation presented itself: Things had changed since he ran that program.

Why hadn't he read the whole disclaimer? And where was he now? Had he been slung into some other continuum? Or was this just a dream?

With an effort, he straightened up. He had to eat, wherever he might be. And while this might not be the best job in the world, it was a job. He started across the lot, tripped over a curving trough, and just avoided a fall onto an angle where one concrete trough merged with another in crossing. Stewart, meanwhile, stepped with easy familiarity over the troughs to a vehicle with high wheels, lots of ground clearance, and a body that reminded Randy of the front end of a fire truck joined to the back end of a hay wagon.

As Stewart heaved himself up to the driver's seat, Randy barely missed putting his foot down a trough, and then almost slipped into a deep-looking puddle that stank of horse manure. It was a relief to climb onto the running board. He was pulling a cover off the passenger's seat when Stewart said drily, "How about some help?"

Randy looked back blankly.

"What?"

Stewart leaned forward over the windshield, which was folded down flat, and tapped the curving red hood. He cupped his hand to his ear as if listening.

Randy stared at him stupidly.

Stewart stared back.

It occurred to Randy that he could lose this job here just as well as back home. He did a fast desperate feat of mental gymnastics, but found no answer.

Stewart shook his head, "Don't stay up so late with bad programs." He pointed to the front of the car, raised his arm to shoulder level, and whipped his forearm around in a circle.

Randy didn't get it, but decided to go look. He took a step, forgetting that he was on the running board, hit the puddle with a stiff-legged splash, and felt the water pour into his shoe. With a sucking squelch, he pulled free, then a lurch and stagger brought him to the front of the car, and now he saw the hand-crank hanging down under the radiator. Randy took hold, and whipped the crank around fast.

Stewart snarled, "Seat it, will you! All you're doing is turning the crank, *not the engine!*"

Randy crouched down, shoved in on the crank, rotated it part way, and it slid forward another inch or two. He gave a heave, and got nowhere.

"Hold it!" yelled Stewart. "Sorry about that! Okay, I've got the clutch in. Try her again!"

Randy gave a desperate heave on the crank, and succeeded in turning it, but

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nothing happened. He tried again with the same result.

Stewart snorted. "This the first time you ever cranked an engine? Keep her going!"

Randy mopped his forehead, and as he took a fresh hold he chanced to notice two battered iron posts sunk into the ground, one near either end of the badly dented front bumper. A suspicion formed in his mind, and he looked up at Stewart.

"What gear you got it in?"

Stewart looked guilty. "Ah—" He pulled on a long lever, and there was a little grating noise. "Not that it matters. It was in low. I've got it in neutral now." Stewart's tone of voice confirmed Randy's suspicion that it did matter, though he had yet to work out exactly how. He took hold of the crank, heaved up, pushed down, heaved up, got the rhythm—

BANG! BAM! BANG!

The crank whipped out of his hands, the car shook, and Stewart yelled, "That's more like it! Okay, let's go!"

Randy detoured the puddle, his foot squelching in his shoe, climbed the running board, got over a metal lip, heaved the cover off the passenger's seat, and almost went out over the windshield as Stewart shifted into reverse. Stewart, possibly in apology, shouted, "Clutch is a bitch!"

The slimy soddenness of his shoe was getting to Randy, and he took advantage of a few seconds of calm as Stewart backed out of the lot to get the shoe off, and wring out his sock. He got that back on just as Stewart speeded up.

They backed fast on some kind of sidetrack, slid to a stop, and with a sudden lunge they jolted forward, hit repeated obstructions with a series of jarring shocks, and then Stewart grabbed his end of the windshield and yelled, "Let's put her up!"

Randy, barely able to hang on, pulled up on his end, tightened the wingbolt, then grabbed for support as they bounced around an uphill curve at possibly fifteen miles an hour; and then Stewart pulled back a lever even longer than the gearshift lever, and they slid to a stop at a traffic light. A cloud of dust rolled over them from the intersection, and then they turned onto a road each side of which looked a hundred feet wide, covered with concrete troughs of all widths and spacings, with horses trotting along at the edges. Randy watched the speedometer needle crawl up, with several shifts of gears, to twenty-five miles an hour, when Stewart set the throttle, glanced around, and grinned. "Still some life in this old baby!" Then he sat back in his seat with the steering wheel wobbling on its own as they thundered through clouds of dust and flies, their wheels locked in the concrete tracks, with Stewart intent on a shouted conversation:

"Don't repeat what Mike told us!"

"No."

"What?"

"I said, NO!"

"It gives us a little advantage to know first."

"What?"

"I said, IT HELPS TO KNOW IT FIRST!"

"OKAY!"

After several interruptions when horses began to pass them on the turns, and Stewart looked askance at the speed-

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ometer and readjusted the throttle, they reached a turnoff; and after a series of jolts through interconnecting troughs, some of them partly crumbled away, they passed a huge sign lettered BRISTOL—HOME OF INTERCONTINENTAL MOTORS—ALL MOTORIZED VEHICLES USE INTERCON OFFICIAL FORMAT ONLY—HORSEDRAWN VEHICLES TAKE ALTERNATE THOROUGHFARES—IN THIS JURISDICTION ALL NON-INTERCON FORMATS ARE ILLEGAL!

They passed through an underpass littered with broken glass, came out the other side, and Stewart hauled on the wheel as they jounced around a corner, went down through another underpass, and crawled out on the far side to see a set of big buildings and a monster sign bearing the huge letters: INTERCON.

At a junction of concrete troughs, Stewart pulled off the road by a long shed under the sign, "Official Inter-Continental Motors Van and Auto Franchised Dealer." He glanced at Randy. "Whatever you do, don't hit the bastard."

An hour or so later, they emerged from the shed with a gray-coated individual meditatively puffing a pipe, who said in the manner of someone mentioning an afterthought, "Of course, that six thousand's the price for the main frame only. If you'd like an engine, the Thunderbolt will run you another nineteen hundred ninety-nine. If the Mule Reliable will do, that will be fifteen hundred eighty-four. You'll want wheels, I imagine; they're sixty-five each. You get one free in the Magnum Package Deal. If you'd like seats, we have a selection at various prices, or you could jam a fence rail into the slots back of the instrument panel deck. The van enclosure runs another two thousand, and it's fitted for the standard interconnecting rear port. That's four hundred ninety-nine."

"What, the van enclosure?"

"No, the rear port. That's the installed price at the time of purchase. Then there are the bolts to hold the enclosure on the main frame. They're special bolts, with grapple plates fitted to keep the enclosure from shifting, and yet it's adjustable backwards, forwards, and sideways, to suit your taste. They're seventy-five apiece."

"The ports?"

"The bolts."

"How are the ports going to match up if they're shifted around to suit my taste?"

"Well, you have to configure the grapple plates to get the ports to match up with the receiver vehicle. That's the point. These are female or male ports, as you specify. Same charge, either way."

"Well—"

"Be sure to get it right the first time. Otherwise we'll have to sell you a hermaphrodite port adapter. And you'll need a rear bracket with a hoist to get the adaptor into place. It's a very delicate piece of work, actually, because you can wreck the port *and* the adaptor."

"What's the total on all this?"

"Depends on how you want it configured, with or without maintenance contract, and whether you want a port adaptor."

"Just give me a rough estimate."

"We don't make rough estimates."

"Then—"

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"It confuses the customer."

"At least the port is standard, you say."

"Oh, sure. Standard OX444, of the InterCon Series 100 Port Type, Revision 3."

Stewart spat out a bad word. "And how do I know that what I'll have to shift cargo with is going be the same type?"

"No problem. Don't deal with anyone who doesn't use the latest InterCon standard parts throughout."

Stewart said shortly, "We'll think it over." He swung up into the driver's seat, and glanced at Randy.

Randy climbed into the passenger's seat.

Stewart looked hard at Randy.

Randy came awake, and went up front to take hold of the crank.

The salesman looked on. "I've known people to get broken arms with that crank. Our new model has an automatic disconnect that works."

Randy swore to himself and heaved on the crank. The engine caught with a roar. There was a thud as Stewart's foot slipped off the clutch. The car, evidently in first, slammed against the posts of the parking slot. This tossed Randy back into the muck and left him with an aching wrist as the engine stalled.

The salesman slapped his thigh, and disappeared into the shed.

Stewart climbed down and made clucking noises.

"It never fails. When that bird starts talking price, I get so mad I can't think. Nothing broken, I hope?"

"Just wrenched."

"Cheap at the price."

"Thanks a lot."

"Scrape the worst of the muck off, and stand on the running board on the driver's side. See it's in neutral, and give it a shot of gas when it catches. Don't sit down in the seat."

On the way back, they were both silent as the dust and flies flew over them, and the roar deafened them. Randy spent the time trying to understand how there could be mud in some places and dust in others, and decided the troughs must drain rainwater from higher ground to lower. At the end of the deafening bone-jarring trip, as Stewart stopped with a jolt against the posts in his parking lot back of the store, he said, "Well—What do you think?"

"Of what?"

"InterCon's deal."

Randy studied his fingernails. "The nouns in my answer will cost you a hundred dollars each. Verbs are eighty apiece. For another hundred, I'll throw in some adjectives and adverbs, and connect everything up. Let me know how much you're willing to pay, and I'll put together an answer."

Stewart grinned. "You should get a job at that place." He glanced at his watch. "Go home and wash off, and this afternoon we'll try the independents. At InterCon, they figure there's no competition. Well, maybe. But we'll see."

The afternoon found them examining broad vehicles with narrow wide-spaced wheels, long slender vehicles hinged in the middle to go around curves, vehicles with rubber cogwheels in place of tires, and troughs to match, so that proud salesmen could show pictures of the

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CogCar climbing near-vertical slopes. There was also an assortment patterned after the vehicles they'd seen that morning.

"Yes, sir," a salesman assured them. "Not only is ours compatible, it is actually superior to the InterCon Personal Car. Ours is higher. You can wear a top hat in our vehicle. We offer 20% more maximum load! Moreover, we have the InterCon standard port, male or female, plus—brace yourselves, gentlemen—THE ENGINE IS INCLUDED IN THE PRICE! Now, any questions?"

Randy hesitated. "This male or female port—How do you know in advance which kind you'll need?"

Stewart nodded.

The salesman smiled condescendingly. "You'll have to have the other kind from the kind you're going to connect with."

"How do you know, now, what kind you may need to connect with after you've made the purchase?"

The salesman favored Randy with the look usually reserved for insects in the soup.

"By that time, sir, you should know what port you can mate with, sir."

"The other vehicle may not have the right port."

"Then you won't deal with him, sir."

"Maybe you want to deal with him."

"And pay the adapter charge? And possibly wreck both ports?"

"What do you need a 'port' for? Why not just manhandle the load from one truck to the other?"

The salesman, bowing beside Randy as if trying to get down onto Randy's level, straightened up. "You do that, then." He turned his back, and called across the showroom, "Ed, you got tickets for the Car Show next week? Save me two. Hear? Two." He strolled away.

Randy took a step after him, but felt Stewart's hand at his shoulder. "Let's go, Randy. To knock his block off wouldn't solve our problem."

Randy walked out. "Why not forget this port mess?"

"You can if your vehicle is an adjustable, and can run different wheel formats. Otherwise, you have to shift load to another truck when you come to a change in format, and on some roads that happens every time you cross a municipal boundary."

"Why the different wheel spacings?"

"Why doesn't everyone like the same food? InterCon likes one wheel width and depth, and somebody else likes a different one, so you've got two, right there."

"For the love of—"

"Sure, it complicates everything. Every so often, a local legislature gets sick of maintaining all the different formats. Then InterCon, or whoever, will give a special deal to drivers to buy their make of vehicle, and finally the voters choose their format as the only one that's legal. That makes it simple for the local highway department. But for truckers, it's a nightmare."

"But where's the problem in swapping loads by hand? Why do you have to have a 'port'?"

Stewart glanced at the drying mud and curving troughs of the parking lot.

"You want to manhandle crates with your feet on that? You want a broken ankle or a cracked skull?"

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"But this male and female business. For—"

Stewart walked behind the vehicle they'd come in, pulled on a lever, and the lower half of the rear door opened down horizontally, the upper half swung up horizontally; and, as he pulled again, inner doors swung out right and left, the four half-doors making an extension open at the rear. Several inches underneath, two steel beams slid back below the lower door.

"This is a so-called male port. The female port is wider and higher. Now, watch." He heaved on the lever, and the two steel beams slid further, to project beyond the rear of the extension. "These support the floor of the joined ports, and the ends rest in brackets underneath the other vehicle's port. That joins the vehicles, and nobody slips in the mud or drops freight overside. But, boy, if the troughs are curved, or the trucks don't match just right—"

"Why not just have a gate that drops down at the rear of the truck, with a chain on each side to keep the gate horizontal? That would work."

Stewart thought it over. "Maybe. Unfortunately, we've now got regulations that require male or female ports, made to the standard pattern. This is the standard pattern. At least it's less bad than the gas nozzles. If they come out with one more pattern—"

"What, for the gas pumps?"

"At last count, there were eighteen different designs, and they make the intake on the auto to fit the nozzle. It depends on which car company strikes what deal with which gas company. Well, let's go see Jake."

Randy, his head spinning, cranked the car and climbed in. Stewart started to pull out onto the road, then jammed on the brake. Out in the street, a truck rumbled past pushing a row of little shovels through the concrete troughs, to leave dirt and trash in long low piles to either side.

Randy massaged his temples, and watched a horse and open carriage rumble past at the corner. The horse was moving right along, and the people in the carriage grinned at Stewart and Randy waiting for the trough-cleaner. Stewart said, "Ah, nuts," and let the clutch out so fast the car bucked and stalled. This brought gales of laughter from the carriage.

Stewart snarled, "I'll crank it. You work the throttle."

Randy dragged his mind off the question why, if this were a dream, he hadn't woken up yet. He discovered that Stewart had left the car in gear just as Stewart found out, and said some words Randy hadn't heard before. Then they had the vehicle started, and jounced and slammed through the dirt piled into the junctions as the main troughs were cleaned out.

"It would all be so easy," said Stewart, fighting the wheel, "if it weren't for the details. This is obviously the transportation system of the future—and yet—look at this."

On the street in front were two long things like narrow trap doors that popped open as they crossed the intersection. It dawned on him that these were trough-covers, closed to keep the horses from falling where horse-streets and car-streets crossed on the same level. And, of course, the covers had to open for the vehicles to get through.

"Quite a thing," said Stewart cyni-

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cally, "when the trough cover gets grit in its hinges. Either the horses break their legs, or the cars climb out of the troughs."

"Why not pave the whole street and have done with it?"

"We can never vote it in. The horse interests go along with whoever favors the present set-up, and together they vote down any change. To pave the street would mean cars could go near horses, and scare the daylights out of them. And it would end the set-up we've got now, when only horses can go everywhere. Naturally, the horse-freight outfits want to keep that. It makes you wish Gritz hadn't invented the security slot in the first place."

"Who?"

"Gritz. Father of the auto industry. Invented the trough-section casting machine. The idea is to avoid accidents, and be able to keep moving in mud, fog and bad weather. Have a track, like the railroads. It sounds good. But ye gods, when you have a pile-up, or get a freezing rain!"

"Speaking of inventors, weren't there some others—Henry Ford, Thomas Edison—?"

"Ford? Let's see . . . Ford . . . no, never heard of him. Edison? Sure, he invented the electric light, the phonograph, the aerabat, the vacuum tube, and the relay-computer. —Ah, here we are!"

Randy considered the fact that Henry Ford apparently hadn't lived in this universe, dream, or whatever it was. Instead of Ford's aim, "I'll belt the world with reliable motorcars," there were all these people figuring, "I'll patent a new gas nozzle and get a stranglehold on the industry." The car gave a jolt, brought his mind back to the present, and he saw a huge sign:

JAKE'S

Ahead of them, as they bounced through the trough junctions, was a fortresslike building behind a high chain-link fence. Also behind the fence were separate sheds, and small lots filled with cars. Stewart hummed cheerfully as they stopped at a gate, and a guard peered out a slit.

"Password?" said the guard.

"Stewed prunes."

The guard kept his eyes on Stewart and Randy, and spoke over his shoulder. "Stewed prunes."

A man's voice answered, "Get his name."

Stewart said, "Stewart Rafer."

"Occupation?"

"Computer dealer."

The voice said, "Checks."

The guard grinned. "Go in, but drive slow. We got a new shipment and they're fighting over it."

Stewart swung the car around a big metal-sheathed shed, and jammed on the brakes. In front of the shed stood a large man in whipcord trousers and a white silk shirt, with a cigar jutting out the corner of his mouth. Opposite him, a man in a business suit pointed to a steam locomotive three hundred feet away on the far side of a barred gate.

"You'll either let that consignment in, or that's the last load you get from me!"

"You either forget that paper I'm supposed to sign, or the gate stays shut. And I want your personal guarantee on what I buy."

"I can't change a thing. That paper

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was drawn up by the company's lawyers. I don't guarantee anything, either. That's company policy."

"You see that row of junk parked in the lot over there? The slot-headed cretin who brought that in started out just like you, and ended up selling it two cents on the dollar and grateful for the pay. The only thing he could guarantee was that the tires were good. I'm selling the whole load in units of two pairs of tires with vehicle attached. The wheels happen to be InterCon format, so I've had a pretty fair sale."

"I can't possibly—"

"You're selling to me because you need cash. What I need is something I can sell at a fair price with a real guarantee. Take a look at that chain link fence. A while back, I unloaded some so-called bargains that strung my customers up by the ears. Now I sleep in a bombproof bunker with a forty-five under my pillow. Don't tell me about your company lawyers. They don't scare me half as much as a bankrupt customer with a gun."

"What do you suggest?"

"The first thing is get rid of this." He read aloud: " 'Purchaser by inserting the key in the doorlock of the aforesaid vehicle signifies irrevocable agreement with each and every clause, provision, and/or stipulation of this contract, without exception, he and his heirs and assigns forever.' And then this: 'User by paying the purchase price for permission to use this vehicle acquires no ownership right or interest therein, but only permission to use the vehicle under the terms of this contract.' "

"Well, that's just a perfectly standard vehicle usage clause, and you get the benefit—"

"If I try to enforce it, there's only two possibilities. First, the courts throw out the whole thing. Then I look like a fool. Second, they approve it, and I have to hire more guards. No. I value what sleep I can still get."

"What—What deal do you offer?"

"What will you guarantee?"

"The engines will run."

"Are they built-in?"

"Well—heh—they just have to be adapted to fit. There are instructions included. I guess it wouldn't be impossible."

"That doesn't sound too good."

"The engines are all right. The wheels are all right, too."

"InterCon format?"

"Our own format. Exclusive. We've got the rights."

"So nobody else can use it without a special trough?"

"Exactly. We planned to get the monopoly."

"What you've got now is an orphan format."

"We'll sell you the rights!"

"That wouldn't help me any. All you've mentioned so far is the engines. What about the bodies?"

"The frame?"

"That's what I'm talking about."

"You're planning to check all this?"

"I'd be crazy if I didn't."

"The frame is a—er—an adaptation of the old standard InterCon frame. Practically indistinguishable from the Personal Car."

"What's wrong with it?"

"Well, we had them made up in a—ah—a foreign country—to assist in the

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industrial development of—ah—emerging—''

''Skip all that. What's wrong with it?''

''The roofs leak pretty bad in the rain. And what they used for paint— well—but you don't have to worry about that. The disclaimer covers everything.''

''Except a customer with a gun. So the paint's no good and the roof sealer's worthless. How's the structure?''

''It's just as good as the InterCon job. Why not? It's a straight copy.''

''What else?''

''The brakes are all right. The clutch will snap your head off.''

''Now we're talking. Bear in mind who's going to demonstrate these things. You.''

''I can find someone better.''

''I can't. How about the literature?''

''The maps?''

''The maps and instructions. A car's no good if you can't figure where to go with it, or how to shift gears.''

''We were figuring to sell the documentation separately, with the spark plugs.''

''I asked what good it is.''

''Some of it's copied from InterCon. That part's all right. The rest is good to give to your enemies. I don't think we've got the road to hell in there, but there's a lot of places you don't want to go.''

''Doesn't matter as long as it's labeled right.''

''Together with some stuff that looks great, but there isn't any place it matches up with. It's good for a demo.''

''We can sell that for novelty. How about the rest of the documentation?''

''Ah—You mean the instructions?''

''What else would I mean?''

''You want the truth?''

''No good, eh?''

''We hired a guy to put together a hundred pages that would look good, and we gave him two weeks to do the job. He cobbled stuff together from copied InterCon drawings and an encyclopedia on mechanical design, and patched a pretty good introduction onto it. Not a bad job. The only problem is, it doesn't tell how to get the engine into the frame, or the wheels on the axles, or anything else you need to know. Of course, if you can read it and understand it, you already know enough to do the job without any instructions.''

Beside Randy, Stewart, who had been smiling, gave a low curse, shifted into gear, and backed up. Behind them, another high-wheeled car was just coming in, but Stewart managed to get off onto a sidetrack before this second car ground past.

''Nuts,'' said Stewart, hauling on the wheel. ''The trough's full of muck. All we need is to climb out of it.''

''Then what?''

''The guide wheel, here—'' he tapped the steering wheel—''is only meant to shift troughs at the junctions. It'll tear your arms out by the roots if you try steering through raw muck.''

He stopped at the gate, to shout, ''You're gunked up in there!''

''Trough cleaner's down!'' The gate opened. The car jolted forward.

''Miracle it didn't stall,'' snarled Stewart. ''Damn it! I've got to deliver, and I've got to pick up repairs! But how do I do it? Did you heard that S.O.B. talk?''

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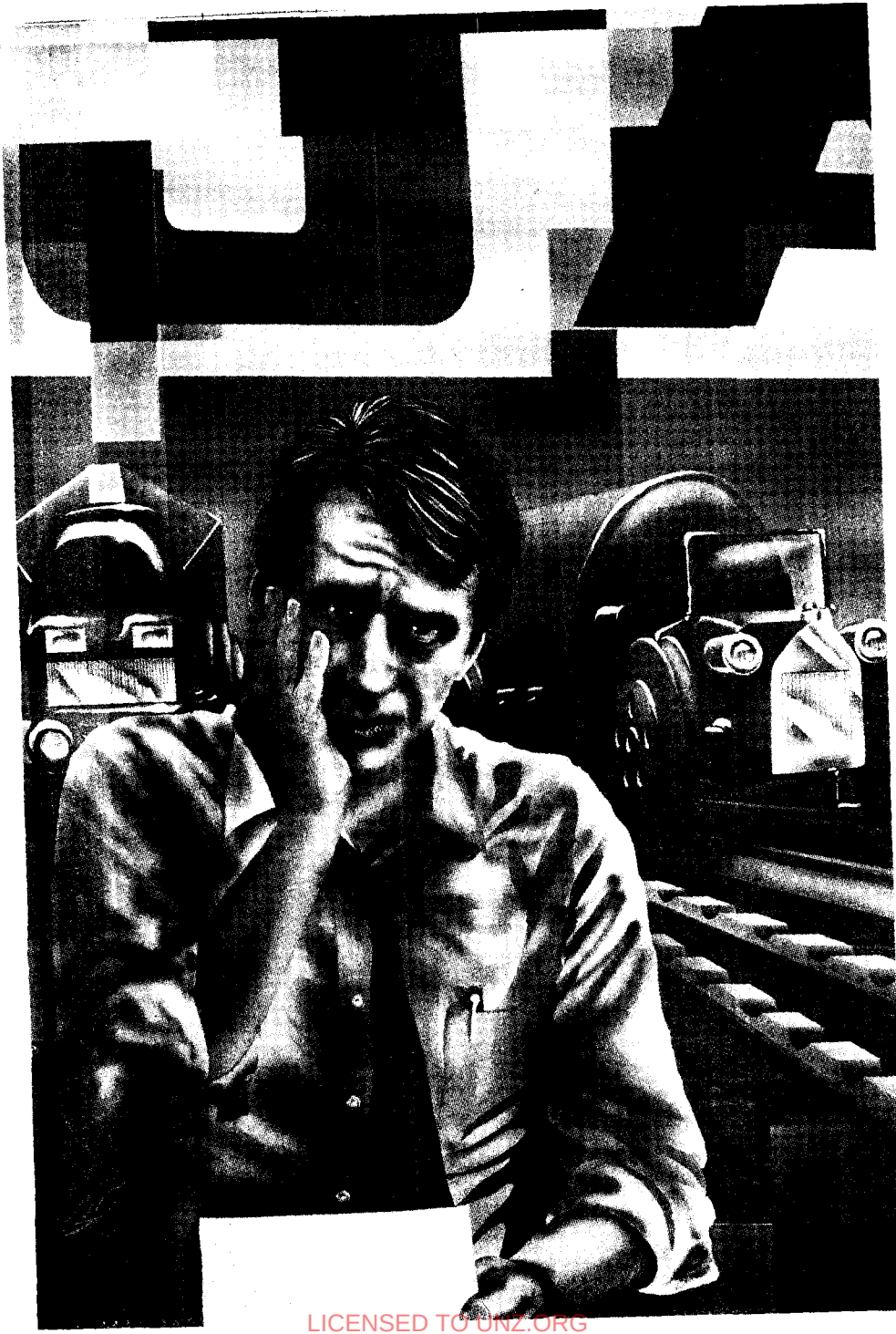

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"The guy arguing with him seemed all right."

Stewart hauled the wheel around, and they pulled out into a steady stream of traffic.

"Jake's okay. That was all bull about his customers being out to get him. It's the dealers. Boy, there are those who hate him!"

"Why not buy from him? At least you'd know what you were getting."

"Sure, but buy what? I want something I can count on." Stewart stared ahead, and made a grab for the brake lever. "Hang on! Somebody's jumped the trough! LOOK OUT! IT'S A PILE-UP!"

There was a crash ahead. Their own vehicle slowed, then slid. There was a jolt as someone banged them from behind. A quick glance back showed Randy a monster van right behind. Off to the side, teams of horses trotted, eyes front, blinders cutting off the sight of the crashing cars.

Randy glanced at Stewart. "We should have got a horse!"

Stewart gave a fleeting grin. "Why tell me now? LOOK OUT!"

The car in front slammed to a stop. There was a sledgehammer shock, a blinding whirl of dust, a crash, blackness, remoteness, and then finally, light, and a voice.

He was slumped forward, his forehead against hard metal. He tried to stand, and landed painfully on one knee. His eyes came open and he saw a dim flat surface. He stumbled to his feet, looking for wreckage from the crash. He seemed to be in a dimly lit room.

In the dimness, a reflection glinted from the chromed Cougar emblem of his computer.

His wife asked anxiously, "Are you all right?"

He put his hand on the computer. It at least felt real. "Physically," he said, "I feel horrible. But it could be worse. What time is it?"

"Almost twelve."

"You haven't been to sleep?"

"I was waiting for you."

"You haven't been in here since I started to run Armagast's program?"

"No. Randy, what is it?"

He described what had happened.

She said, "It was like a dream?—A vivid dream?"

"A vivid dream that compared the computer industry to the state the auto industry might be in if it had our problems."

"Did it help?"

"Well, my problem was, what has gone wrong? I've got plenty of answers."

"You look awfully tired."

"It wasn't restful. Wait while I put things away."

The next day found Randy peering through bloodshot eyes at a hung-over-looking Stewart Rafer.

"Pratt," said Rafer, "ah—this Armagast program—I took it home. Ah . . . Suppose the Wright Brothers —No. No, forget that. Now, about this program—I think it's salable, but—Things are tight. We can't have you making purchases for the store without confirmation from me. You understand that?"

Randy forced a nod.

Stewart—this Stewart—looked at him owlishly.

"All right. Now, there's this business

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of the Gnat computer. How do you explain what we're going through with all these returns?''

Randy scowled. The Gnat was Stewart's idea. Now he, Randy, was supposed to explain it?

He reminded himself that he needed this job, and groped for a courteous answer.

Out in the showroom the outer door went shut, and light footsteps approached in the hall. Stewart and Randy glanced around. There was a rap at the door. Stewart said, ''Come in.'' Randy's woman customer of yesterday stepped inside.

''I've brought my Shomizota printer, to be—ah—configured? It's in the trunk of my car, out front.''

Randy winced. ''Without the Superbyte, I—''

''I brought my Superbyte.''

Randy cast a look of appeal at Stewart.

Stewart turned solicitously to the customer.

''We believe in total service here. Mr. Pratt will be glad to take care of it.''

Randy went out to the car, and carried in the Shomizota. As he went back for the Superbyte, a thought occurred to him.

Would Armagast's program handle customer problems?

Why not?

He lugged the Superbyte into the showroom, and the customer said sweetly, ''Mr. Rafer has assured me you'll be happy to take care of this, too.'' She handed him a box labeled, ''WordSnapper 2 For UltraByte Computers.''

As Randy groped for words, she said, ''Now I must run,'' and left.

From the repair shop down the hall came a curse from Mike the technician, who hardly ever swore.

Randy massaged his temples, opened the word processor box, and found no instructions. Where was whatever literature Snapper Software had included with this thing?

The outer door opened. The mailman tossed some bills on the counter and went out.

Randy, examining the Shomizota printer, found a big envelope, dumped the contents, and sheets of Chinese-Japanese characters looked up at him.

Randy drew a careful breath, and reminded himself that he only had to get through the rest of the day. Then it was home to his Cougar and Armagast's program.

He glanced up as the doorlatch clicked again. A well dressed man come in with a precocious-looking boy carrying a Gnat computer. Stewart emerged from his office, a crumpled bill in his fist, to whirl as a crash and a string of oaths echoed down the hall from the repair shop.

It suddenly dawned on Randy that the Computer Age's bugs weren't confined to the hardware and software. There were humanware bugs, and he was about to see them crash the system.

He was scarcely aware of his brief silent prayer as he approached his boss. ''Excuse me, Mr. Rafer. Mike mentioned something yesterday, and I should have passed it on to you. If I could see you just a moment—''

Stewart eyed the Gnat, glanced toward the repair shop, excused himself

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to the customer, and stepped into his office.

Randy kept his voice low. "Mike said he can't handle the Gnat repairs plus the forty-eight-hour fix we've been promising. If he decides to quit, we're sunk. Let me promise him we'll forget the 48-hour till the Gnats are out of the way."

Stewart hesitated, then nodded. "But hurry up. He's about to erupt."

Randy, moving fast, knocked on the repair shop door, and stepped inside.

"Mike, excuse me, I told Stew you needed more time, and he agreed. He says you can forget the 48-hour fix till you've had time enough to get the Gnats out of the way."

Mike looked at him wildly. "Nobody could keep up with this!"

"Don't try. Take it as slow as you have to. We appreciate your trying, but anybody can only do so much."

"Forget the 48-hour fix?"

"Till the Gnats are out of the way. I think we're almost at the end of them."

Mike blew out his breath. "Okay. I can live with that." He bent down and set a dented wastebasket upright. "Push over that stool, will you, and shut the door tight when you go out. Thanks for talking to Stew."

Randy, coming back down the hall, heard Stewart talking to the customer:

" . . . any amount of *trouble* from these Gnats, but we'll back up the warranty as best we can. My hardware specialist warned me about the machine, but I didn't believe him."

Randy stopped in his tracks. Was he still stuck in Armagast's program? Why was Stewart being reasonable? Then it dawned on him—Stewart had used the program, too.

The customer was saying, "As long as you'll back up my son's Gnat, I'll ask you something else. What do you have that's reliable?"

"I—ah—"

"I don't need the latest electronic miracle. I need a machine I can count on."

Stewart glanced at Randy, who mentally shifted gears.

"There's the Sharke II. That's been *very thoroughly debugged.*"

Stewart objected. "It won't run the latest software. The Superbyte is faster, has a lot more RAM, more—" He paused. With an effort, he said, "But the II is very reliable. That's true." He excused himself.

Randy spoke carefully, straining not to be like any salesman he'd met recently in Armagast's program. "Mr. Rafer is right that the Superbyte is faster, and has more capabilities. But the Sharke II is very reliable, has excellent instruction manuals, comes with a good deal of useful software, and costs a lot less."

"Okay. Let me have some literature, and I'll be back when my son's Gnat is fixed to look this machine over. And—speaking of my son, where—"

A beeping noise became evident, from back of a post on the other side of which was the Sharke Graphics 1000. The customer smiled, took the literature, got his protesting son loose from the Graphics 1000, and went out. Randy sat down by the Shomizota printer, thinking.

Stewart came back into the showroom.

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Randy looked up. "He said he'd be back to look at the II when we get the Gnat fixed. I don't think it was a stunt to hurry us up. I think he wants a reliable computer even if it's behind the times."

"No matter what you buy just now, it will be behind the times pretty quick."

"It's a point." Randy frowned. "There's something here—some—"

"New approach to the consumer market? Possibly the industry has enough wonders for now, and ought to refine them?"

"Maybe, but also, there's a—a problem with people, aside from computers. And we're all people."

Stewart nodded. "It's almost sunk us. We've got a computer/human interface problem. Plus an expert/novice interface problem. But that Armagast program, anyway, was a good buy." He went back to his office.

Randy eyed the Shomizota printer he was supposed to make work with the Sharke Superbyte. Possibly he could get it to work despite the problems. Would that make him a sucker—or would it be good salesmanship?

From some dimly remembered book or article came a quote—"Send one customer away happy or mad, and you win or lose six others." That customer would tell his friends.—Was it, maybe, sixteen others? Frowning, Randy remembered an earlier thought—there are bugs in human nature. And one was to expect everything of the new, while overlooking the familiar. Since computers involved so many things that were new, had the industry junked an unusual number of reliable truths?

At that moment, Stewart came back into the room and glanced at the printer.

"Any luck?"

"The documentation seems to be in Japanese. I have a hunch she got this from some friend who stopped off in Tokyo. But I'll see if I can get it."

Stewart nodded approvingly. "I just had a thought. That Armagast program seems to induce a—ah—a problem-solving approach. Now—Why shouldn't Mort have the advantage of it? True, he's part-time, but, just between you and me—"

"Yes. Good idea. I'll mention to him how interesting the program is."

"He'll be in Tuesday. I'll bring my machine. It should be a good test for the program."

Randy grinned. "I'll still bet on Armagast."

"If it works, we'll know he's really got something."

Stewart went back to his office, and Randy pried off the cover of the printer.

From some recess of his memory came a rough rendering of another comment, and this time he remembered who had said it—"If you have trouble in your organization, it will usually be people trouble. Therefore, value those who can solve people trouble."

As Randy eyed the printer's switches, unconsciously he adapted Andrew Carnegie's thought to his own line of work:

"If you have trouble with bugs, they may be hardware bugs or software bugs, but almost always they're the result of people. Therefore, value what can solve the trickiest bugs of all—people bugs." ■

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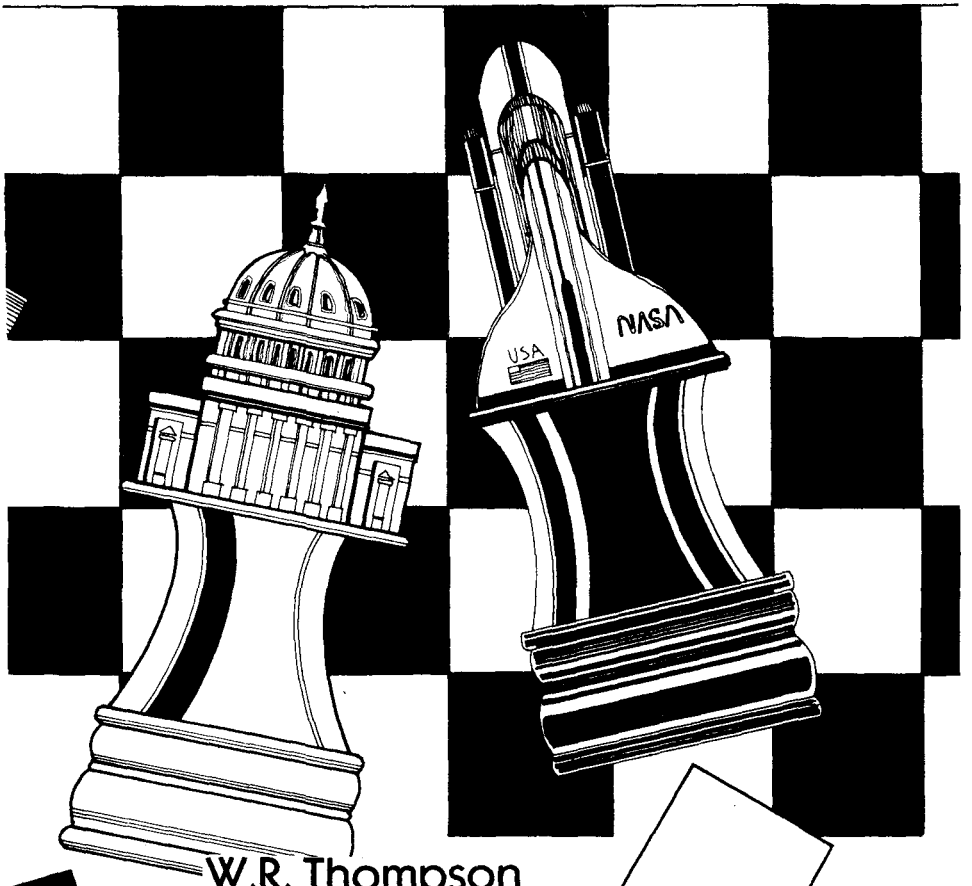

W.R. Thompson

ROCKING THE BOAT

Politicians, by the nature of politics,
are usually working toward at
least two goals—which may
well conflict, thereby requiring
hard personal choices. . . .

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Even from a distance Nicholas Rhineman couldn't be mistaken for anyone else. The NASA Administrator was a small, tidy old man, who walked with a quick and precise gait. Observing him through the office window, it seemed to Greg Weiss that the other people on the sidewalk were trying to avoid him. They might not recognize the man, Weiss mused, but some instinct warned them away from him.

In a grim way, Weiss knew, he was looking forward to this meeting with the sociologist. Rhineman had always been something of an embarrassment, he thought, but now—with his plans to put a colony on the Moon, of all things—he had turned into a political liability. As the President's chief political advisor, it was Weiss's duty to neutralize that problem. He would have to get Rhineman to drop the colony project.

It would be a delicate task. Rhineman wasn't a popular man, but he was respected. For all his shortcomings, he had been a loyal party man for over two decades, bringing in both votes and endorsements from the academic community and other places. Both the party and the President owed him a heavy debt, and Weiss knew that denying Rhineman what he requested could make trouble—especially for Weiss. Reneging on a political debt was a certain way to ruin a career.

On the other hand, a colony was a political impossibility. The taxpayers would resent the cost of more scientific boondoggling, and it would take a lot of maneuvering and log-rolling to line up Congressional support. Worse yet, dozens of pressure groups would demand the same sort of attention that they saw going to NASA. When they didn't get it, discontent and resentment would cascade through the political community. That sort of trouble could be quelled, but only with great difficulty.

Standing at his window, Weiss told himself that there was only one way to keep the trouble from spreading: Rhineman would have to persuade himself that the colony was out of the question. It would require a good deal of finesse, but that was his specialty. Rhineman was a tumor in the body politic, and it was Weiss's task to excise the cancer before it could spread. He had a sudden image of himself as a surgeon, operating to save the life and health of the nation.

Or to prolong its death, he thought suddenly, as he allowed himself to notice the cityscape outside his window. Not all of Washington was worth seeing, not by any means. Beyond the rows of neat government buildings he could see the smoggy tangle of slums. No matter how much cash we sink into them, he thought, they never change. Irritated by the sight, Weiss shut the curtain.

The intercom buzzed. "Administrator Rhineman is here," his secretary's voice said.

"Send him in." Weiss sat down behind his desk.

Rhineman entered. Seen up close, Weiss found him to be a bland and neutral man . . . an image he had worked hard to create, Weiss thought in amusement. While not a perfect image, it was politically more acceptable than his long-ago appearance as a hard-core intellectual. But under the surface, Weiss reminded himself, Rhineman was still a highbrow. It showed through the cracks in his shell.

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"I'm sorry to have called you away from your work," Weiss began, "but we must discuss your budget request for the next fiscal year. You see—" he laid a finger on a neat stack of papers on his desktop "—it's too large. You have to give up some things, or it won't get through Congress."

"You're talking about the lunar colony." Rhineman's cool, rheumy eyes went from the copy of the report to Weiss's face. "I've already talked with the President. He's agreed to present it to Congress."

"He may have to change his mind, I'm afraid." Guide the man through this gently, Weiss thought. Let him see that some things are beyond the President's control. Convince him that the noblest thing he can do is to give up what he wants. It was a course of action that Weiss had taken successfully with other people, many times before this. "A lunar colony would mean almost doubling the NASA budget. Neither Congress nor the public is in any mood to spend all that money in space."

"The money will be spent here, in the United States." Rhineman's voice was an humorless as his expression. "We intend to put people and hardware on the Moon, not bales of cash."

Weiss sighed. "I was speaking metaphorically. A colony would absorb a lot of the nation's resources . . . limited resources, resources which a lot of people will say ought to be put to better uses. Now—" he glanced at the report's plain white cover "—your plan talks about using the colony as an asteroid mining base. Wouldn't space stations work just as well, and cost less? We already have space stations."

"We have *a* space station," Rhineman countered, "which is by and large an orbital factory. It has little potential for expansion. A lunar base will cost only slightly more than an equivalent orbital station—and it gives us the option of mining the Moon as well."

Weiss grunted. "That's on the assumption that space mining can pay."

"It's no assumption. Our probes have told us what metals are in the asteroids. We can get them. The cost will be lower than terrestrial mining costs, according to our estimate."

"We all know how wrong estimates can be," Weiss said. Keep it gentle, he told himself. Right now he had to set up the background situation for Rhineman, to make him aware of the fact that there were many objections to a colony. Weiss had no interest in whatever points the administrator could make right now. Political necessity had already set his position.

"I can't disagree with that," Rhineman said. "However, it's a fact that the price of terrestrial mining has been rising steeply for some time, thanks to resource depletion and environmental considerations. I've contacted some mining interests, and they are quite interested in new sources of raw materials." He paused, then went on almost casually. "They're aware that space mining can free us from our dependence upon South Africa for such raw materials as chromium, vanadium, and cobalt. We can't run our industries without them, and we can't afford to continue paying South Africa's prices for them. In addition, I would remind you that many people in this country despise the

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South African regime and do not want to do any business with it."

"You've got a point," Weiss conceded. He smiled inwardly. Let Rhineman believe that he had control of the conversation, Weiss thought. It would put him off guard. "But we're talking about things which are years in the future. The trouble with politics is that we have to think about the next election—and how to win it. Spending large sums on a project that might pay off after five years or more is not the way to win elections." Weiss shook his head. "I'm not against your colony, Doctor, but I'm trying to make you aware of the objections to it. For example, several thousand people would leave Earth for the Moon—forever. That's just a beginning; more people would follow the first colonists. And we're talking about the finest minds our nation has to offer, aren't we?"

"I should hope so," Rhineman said. "The best minds are always attracted by the greatest challenges."

Weiss felt like a duellist whose opponent has made a clumsy move. He stood up, went to the window and opened the curtain. Turning his back to Rhineman, he seemed to address himself to the smoggy view. "This nation is cursed with poverty, unemployment, racism, pollution, resource depletion, agricultural imbalances, educational deficiencies, even religious intolerance. While these finest minds are occupied in space, who'll be working on our problems down here?" Shaking his head, Weiss shut the curtains again. As he turned around he saw that the old man was watching him, an intent look on his face.

"Is anyone working on them now?" Rhineman held up a hand. "No, spare me the campaign rhetoric. We both know how ineffectual the government has been. Most of its attempts to solve problems have degenerated into bureaucratic empire-building . . . and we know that few agencies really try to correct the problems that justify their existence."

"Unlike *your* agency, of course," Weiss murmured sardonically. He had heard this sort of thing before, from men and women just like Rhineman: self-serving bureaucrats, people who had pulled every string in their reach to get where they were, and who would continue doing so to retain their positions. Intellectual or not, he saw Rhineman as just one more member of the cynical, manipulative pack.

The administrator hadn't missed Weiss's tone. He leaned forward in his chair. "Let's drop the pretense, and talk about why you want me to drop the colony."

All right, Weiss thought acidly. "Because ramming it through Congress would cause more fighting than I'm willing to accept—"

"You do a lot of fighting to get what the President wants."

"But only when it serves a purpose," Weiss said. "And the purpose is to serve the administration—not to weaken its political base."

"In other words, self-preservation. Very well. What is it that *you* have against a lunar colony?"

"Well. . . ." A pleasant feeling washed through Weiss. Now he could get down to cases and tell Rhineman why his colony was out of the ques-

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tion—which would be the same thing as telling the sociologist why he disliked him. There was more than a casual connection here, Weiss thought.

Weiss picked up the colony report and riffled its pages. "Doctor, you've put forth a lot of reasons as to why this country 'must' have a lunar colony. I'll admit that a few of them are good reasons. If this country could afford to fritter away its resources—well, it can't." He shook his head. "The thing is, you've left out one argument in favor of a colony, and I think it's your *real* reason for wanting the thing."

"Ah. And it is?"

"The so-called technological lifeboat." The enigmatic smile on Rhineman's face made Weiss feel irritated. "It's something that you spaceflight fanatics have blathered about for decades. A colony in space could preserve a vestige of technical and scientific know-how, so after things go to hell down here, you could rebuild.

"We both know why you didn't put that in print," Weiss pressed on. "It would be political suicide these days. Everyone knows that the world is on the brink of disaster, from nuclear weapons, from pollution, from population, from —never mind! Your colony would save an elite from disaster, while the rest of us go hang. The people aren't going to spend billions to save your sort."

"My sort." Rhineman looked more thoughtful than usual.

Learning forward in his upholstered chair, Weiss bore down on him. "Intellectuals. Scientists. The 'great minds' who always promise to solve our problems—and who hand us answers that just make things worse. The ones who tell us that we don't know how to fix our own problems."

"I already knew what you meant. I'm just surprised that you believe that."

"The public believes it," Weiss said. "I accept it, because I deal in political realities." He gave Rhineman a chilly look. "Do you want to know what *I* have against you, Doctor? Besides your intellectual arrogance? The thing is, this nation is already like a lifeboat in the water. We're swamped and almost awash with our problems. It's my job to keep damned fools like you from rocking the boat and sinking us."

Rhineman fingered his chin for a long moment before speaking. Then: "Would you mind hearing why I didn't put the lifeboat concept in the proposal?"

Weiss shrugged. "Go ahead."

"A lifeboat is a sensible thing to have—but you only get into it when the ship is sinking. As I see it, founding a colony to serve as a lifeboat would amount to a public declaration that our world can't be helped any more. That might even speed up a final disaster. I want this colony to have the opposite effect."

Here comes the sales pitch, Weiss thought. Rhineman was about to tell him why he wanted the colony. After he did, Weiss would demolish his arguments —and Rhineman, if need be. Even after twenty years in public life, the sociologist hadn't developed the mindset of a professional politician. Weiss knew that Rhineman was an amateur at infighting, a man who had trouble getting his own way when dealing with other politicians. "What effect are you looking for?" Weiss asked, with deceptive mildness.

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"I wish to set up a resonance effect." Rhineman's brow furrowed. "Resonance is a concept we sociologists borrowed from the physical sciences. Are you familiar with it?"

"Sort of." Weiss looked up at the ceiling tiles while something drifted up from his memory. "I recall something from high school physics about getting objects to vibrate in synch."

"You must have gone to school before science courses were made optional," Rhineman said. "Well, physical resonance takes place when the waves given off by a vibrating object force a second object to vibrate at the same frequency. The waves can be radio waves or sound waves—for example, your eardrums are in resonance with my vocal cords.

"We don't fully understand social resonance, I'll admit, even when we observe it. It occurs when the emotional attitudes of one group spread to other groups—"

"That sounds like quite a trick," Weiss interrupted. He didn't see any reason now to hide his sarcasm. "How does it work? Telepathy?"

"Hardly." Rhineman's tone became harder and drier than before. "It happens when people see a certain type of behavior, and are in a mood to imitate that behavior. The classic example of resonance would be of a panicky man shouting 'Fire!' in a crowded theater. Under those conditions, the people around him would most likely panic with him. Obviously, they wouldn't panic if the theater wasn't jammed, or if the crowd was at the beach."

Weiss ostentatiously stifled a yawn. "That's not a very original idea. It's like observing that things fall down when you drop them."

Rhineman nodded. "And observing that fact led Newton to discover the law of gravity. Well, social resonance is widespread, when you know what to look for; you see it when people start doing new and seemingly inexplicable things. Consider how the Germans embraced Hitler and Nazism. Look at hero worship, the spread of fads, and the way people imitate public figures. Historically, observe the effect the frontier had on America."

Weiss smiled. Clearly, Rhineman was about to link the colony to the American frontier. It was a hoary and simplistic concept, Weiss thought, but that suited him perfectly. Having heard it before, he would be able to punch holes in Rhineman's analogies as quickly as he drew them. "It's an intriguing notion," Weiss said invitingly.

"Yes," Rhineman said, watching the man nod. "Now, there's a lot of debate over the exact influence of the frontier, and even over the definition of 'frontier.' It was nothing like the myth, though. It wasn't just hazardous and uncomfortable; moving to it was so expensive that few people could become pioneers. They weren't 'lone wolves'; survival on the frontier demanded cooperation and other social skills. Some pioneers grew disenchanted with the new life, and returned to more civilized areas.

"Myths, aside, though, there's no doubt that the frontier era was a good time for America—not a perfect time, but a time when our country grew and did well. The resonance theory accounts for that by saying that the frontier gen-

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erated a dynamic, positive outlook in the main body of society. Pioneering has a certain élan which is contagious. That's why we need a colony: to revive that attitude."

"Interesting," Weiss murmured, looking at Rhineman through hooded eyes. He had spotted the flaw in the analogy. If he could force Rhineman to acknowledge it, he could end this affair now. "But the pioneers were respected, weren't they? They tamed a continent. They got things done. If people 'resonated' to them, it was because they *earned* respect."

"Precisely," Rhineman said. "People respect success. A permanent lunar colony and asteroid mining will be things they can respect, especially after mining starts to pay off."

"So you claim," Weiss ground out. He felt vexed with himself. I should have known that Rhineman would dodge the issue, he thought.

"It's worth a try, isn't it? Our country is in trouble. It's depressed and drifting, resonating to things that can destroy it . . . just like Rome, before it fell, or Germany, before Hitler took over. We have a responsibility to lead it out of trouble."

"This country doesn't want leadership," Weiss said harshly, surprising himself with his candor.

"You've never offered it any. Have you listened to yourself today? You've told me about our problems—" Rhineman made a sharp gesture at the curtained window "—but only so you can prove that they can't be solved. You've told me why my attempt to change things can't work, and why I ought to give it up. With leaders like you to resonate with, it's no wonder our country is rolling downhill."

"I'm not a leader."

"You are," Rhineman told him. "You're just not an elected leader. If you didn't have some kind of authority, official or not, I wouldn't be here talking with you. You just won't use your power."

"I'm using it," Weiss grated. He stood up and leaned over his desk, menacingly. "I'm trying to keep fools like you from making things worse."

"By keeping things as they are? A while ago you accused me of rocking the boat. Well, I *am* rocking it, because—" he made frantic scooping motions with his hands "—you can't hold still while you're bailing out the water." Rhineman paused, then added in deliberate tones, "But *you* can't see that. All that interests you is holding on to your position."

Weiss's temper began to flare—and then subsided. He almost smiled as he lowered himself back into his chair. Rhineman had just handed him the opening he needed to get his way . . . and to take the arrogant son of a bitch down a few notches.

"Maybe you're right," Weiss said slowly, trying to sound as if Rhineman's barb had wounded him. "I couldn't say. But. . . ." He let out a sigh. "Okay. There's still the problem of getting Congress to approve the funds, and of keeping someone from slashing the budget later."

"I've known that all along," Rhineman said.

Weiss fingered his chin. "It'll be no small trick to swing this. You know that

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people don't care for intellectuals and scientists—''

''I'm aware of that,'' Rhineman said. ''American anti-rationalism shows in the way we've let our school system collapse, in the way we use words like 'egghead' and 'highbrow' as insults, in the way—''

''I already have the picture,'' Weiss said, as mildly as he could. Rhineman's manner seemed almost designed to grate on his nerves, he reflected. ''And I'm glad you have it, too. As I see it, *you* are the major obstacle to getting this colony.''

''I know,'' Rhineman sighed. ''People see me as an ivory-tower type. They won't like it if I fritter away their money on some, er, lunatic notion.'' Rhineman looked at Weiss. ''Are you going to suggest that I resign?''

''Well, that *would* simplify things.'' Weiss felt triumphant. He knew that Rhineman wouldn't resign—and Rhineman knew it too, he thought. For all his bluster, the man would clutch his power and status as tightly as anyone else in Washington. That kind of self-knowledge ought to humble him, Weiss reasoned, and drag him down to the level of the people he despised. ''It's asking a lot, but if the colony is as important as you think—''

''—it's worth it,'' Rhineman concluded. He sounded dubious, as though he was looking for a way to back down. ''But would it work?''

''Oh, sure,'' Weiss said with relish. ''If you stay at NASA, everyone will think that the colony is just an attempt to build up your own agency, and that alone will kill the project. But if you're out of the picture—yes, we can line up enough support to do it. People won't feel that they're doing you an undeserved favor.''

''That's most logical.'' Rhineman reached inside his suit coat, took out an envelope and gave it to Weiss. ''Here's my resignation.''

Weiss opened the letter and read it several times. It was brief enough. '' 'Reasons of health,' '' he mumbled.

''That's a little white lie, of course,'' Rhineman said quietly. ''Everyone is going to know that you got me to resign—this meeting of ours is no secret.''

Weiss felt numbed. How could I have miscalculated so badly? he asked himself. ''You're blackmailing me,'' he rasped out, dropping the letter.

''I am. Everyone will assume — correctly—that we made a deal: my resignation in exchange for your support of the colony. People may not like me, but if they see you breaking our deal . . .'' His voice trailed off suggestively.

Weiss understood. His entire position depended upon having people accept the value of his promises. If he betrayed Rhineman, his power would evaporate with their trust. Weiss knew he was trapped. ''And you're tossing away your career for this colony,'' he said in wonder.

''What's a career?'' Rhineman shrugged. ''A means to an end. My aim has always been to lift this country out of the doldrums. The colony is the means to that end.''

''And you've been working for *twenty years* to get this colony?'' Weiss shook his head in disbelief—although right now anything seemed possible.

''Oh, hell, no.'' Rhineman seemed

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to be relaxing now, slipping out of his ineffectual persona. "I didn't get into politics with that in mind. No, I just started out with this quixotic feeling that I had to do something to pull my country out of a quagmire of cynicism and despondency . . . although for a long time I didn't accomplish much. As a sociologist, I could see our problems, but their answer eluded me.

"Then the resonance theory came along, just a few years ago. That, and a little imagination, told me that a lunar colony would serve my purpose. I had already built up a small political base, which I used to wangle my post at NASA. Once there, I started laying the plans for a colony.

"But I can carry things just so far by myself. As you've noted, there is a lot of resistance to a Moon colony. I've known all along that I could never overcome that opposition by myself—"

"So you tricked me into demanding your resignation," Weiss said.

Rhineman shook his head. "I gave you a few nudges, but it was your idea —and a predictable one." He gestured at the letter on the desk. "Both of us could see that I couldn't have both the colony and my NASA position, but we had different ideas about which I wanted more. You assumed that I was in resonance with the spirit of our times, and that I would rather sacrifice the colony than my career."

"Why didn't you just ask me for help?" Weiss demanded. He threw up his hands in disgust. "Never mind—I would have said 'no,' of course. This whole resonance thing sounds even crazier than a colony."

"Which is why I've never discussed it before. To somebody who doesn't understand the concept, or accept it, it seems preposterous to base a major policy decision upon it. But it will work, given a chance and a few years." Rhineman stood up. "I'm sorry to have to quit my post, of course, but I *am* glad that I have your support—and my quitting *will* make the task easier for you. Well, I had better go to my office and clean out my desk."

For quite some time after the elderly sociologist had left, Weiss stared at the letter. Because he had no choice at all, he would have to give Rhineman what he wanted.

To his surprise, Weiss found that he had developed a grudging respect for the sociologist. Rhineman had obtained everything he had wanted, and he had outmaneuvered Weiss at every turn. The sort of skill that had demanded impressed Weiss enormously. Clearly, Rhineman was no fool.

Maybe the old boy knows what he's talking about, Weiss thought. Abruptly, he got up, went to the window and opened the curtains. The decaying society which he had tried to ignore was still out there. Reversing that decay was an enormous challenge . . . but it no longer seemed impossible. Weiss realized that he actually wanted to face that challenge.

The politician grinned at his reflection in the window pane. Somehow he had been converted to Rhineman's way of thinking. If the sociologist could know about that, Weiss mused, Rhineman would have said that they were in resonance. But he couldn't know about this—could he? ■

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The Alternate View

GUN CONTROL

G. Harry Stine

Fifty years ago, an effective and eminently workable system of gun control was in existence around the world: A person had to be trained to use a gun and possess the self discipline to keep it clean and in working order. In short, guns wouldn't work very well for very long in the hands of an illiterate clod. Today, technology has removed that form of gun control.

The most obvious and visible example of this is the dramatic rise in the number of acts of terrorism and the ease with which terrorist acts are committed.

But what is terrorism? A terrorist kills, maims, kidnaps, and tortures. So what's the difference between terrorism and other crimes? Terrorism is political in a way that other violent crime isn't, and the difference lies not in the nature of the violent act but in the understanding by its perpetrator of what he's doing. Organized crime acts for private purposes. So do most common criminals. Lone assassins such as John Hinckley attempt to kill for private reasons. But terrorists such as those who hijacked the *Achille Lauro* had a public goal in mind.

However, they couldn't have done it without personal firearms. Can you imagine their doing it with knives? Even high explosives require some training in order to use properly, although a terrorist often commits suicide whilst making good on a bomb threat.

Terrorists had trouble doing their thing fifty years ago, not because they couldn't get perfectly adequate firearms but because the firearms might not have continued to work for them, regardless of how new they were at the time.

Nonsense? A gun's a gun, right? Nope, not until 1947.

Black powder—often called "gunpowder" although that's a generic term for all gun propellants—was invented in China around 1260 A.D. The Chinese had cannon by 1356, about the same time guns were used in the Siege of Metz in 1324 and by the English at Crecy in 1346. Yet by 1509 the Portuguese had achieved naval supremacy in the Indian Ocean. What happened to the Chinese and the Indians who also had black powder and guns?

Early guns were complex, as might be anticipated of any device resulting from new, primitive technology. They required care, and they needed skilled people to operate them. The muzzleloading cannon and smoothbore musket both required an elaborate and exact drill in order to load and fire with any degree of safety for one's self and comrades alongside. It was impossible to put a flintlock in the hands of an illiterate peasant and expect him both to operate it safely and keep it operating. The loading and firing of a musket might involve a sequence of thirty-six separate and distinct actions and commands, each of which had to be done in order and done properly. Drill was mandatory. The precision of the drill depended upon both officers' and sergeants' knowing the

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manual cold and imparting this knowledge to the troops so firmly that they could remember it in the panic and heat of battle. Sergeants had to be literate. Officers had to have a knowledge of mathematics and science, which meant that officers were men of education and therefore good families. Non-coms and officers came from the middle and upper-middle classes respectively. Except in Europe, these two classes of people didn't exist in most of the rest of the world until quite recently and they weren't easily created because of the caste system or the mandarin bureaucracy—i.e., social structure.

Using guns required personal discipline as best exemplified in Kipling's poem, "The 'Eathen":

The 'eathen in 'is blindness bows down to wood and stone
'E don't obey no orders, unless they is 'is own;
'E keeps 'is sidearms awful; 'e leaves 'em all about,
An' then comes up the regiment an' pokes the 'eathen out.
All along o' dirtiness, all along o' mess
All along o' doin' things rather more-or-less . . .

The contrast between European and Asian gunners was never more obvious than in 1857–1858 during the Sepoy Rebellion in India. There was nothing backward about the Indian Sepoy troops; they even had cannon. It was the way they used them that led to their defeat by disciplined British troops reinforced by Sikhs and Ghurkhas. The Raja Mahdie's men would lay a cannon barrel on two parallel timbers pointed in the general direction of fire and lash it down with rattan. Once they had loaded it, they would gather around it and pray for a successful firing.

The devotional school of gunnery made nonsense of any gun, regardless of size.

Something of this sort was still going on as recently as 1954 when the Singapore police were all armed with British Enfield rifles to protect the British base against guerrillas. A few years later, an inspection by British armorers revealed that 75% of the rifles had become unservicible due to lack of or poor maintenance.

These were old rifles of World War I vintage that were bolt-operated single-shot clip-fed personal battle rifles designed with marksmanship in mind. A platoon of infantry armed with Enfield rifles could create a beaten zone of fire at a range of 800 to 1000 yards and effectively break up the most dreaded tactic of pre-World War I, the massed Napoleonic infantry assault. The rifles of the time, including the Enfield, the Krag, the 1903 Springfield, and even the M1 Garand, were intended to be used by trained military marksmen, not irregulars.

In 1914 there was no gun that could be handed to an illiterate peasant with any expectation that the gun would be serviceable six months later. The technologies of metallurgy, gun propellant chemistry, corrosion resistance, and ammunition design simply weren't up to it.

The solution came from the Soviet Union which, during World War II or their "Great Patriotic War," had to put millions of largely untrained men quickly and continually into the field with guns that would work well regardless of the

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neglect, the mud of the Russian steppes, and the snow and cold of the Russian winter. The ubiquitous *Pistolet-Pulemyot Shpagina obr 1941G (PPSh41)* was the first step toward the answer. It was a submachine gun that was light, simple, easy to shoot, and cheap to make in huge numbers. So was the British counterpart of the German MP-40, the Sten Mark I, often called the "stench gun" by the firearms purists of the British Army. The Sten was made by the millions using stamped metal parts. The Sten barrel was a drawn steel tube held on by a screwed jacket. Both the PPSh41 and the Sten could be put into the hands of untrained guerrilla and partisans. But they were submachine guns firing 9mm. (.38 caliber) pistol ammunition that didn't have much stopping power and were good for close-range fighting at 100 yards or less. Furthermore, neither the PPSh41 nor the Sten were very accurate. At the time most German soldiers didn't know that, which contributed to the effectiveness of these guns.

The ultimate personal firearm was designed by Soviet tank commander Mikhail T. Kalashnikov who showed a surprising talent for firearm design while convalescing from wounds suffered at the Battle of Bryansk in 1941. In 1947, the *Avtomat Kalashnikova (AK47)* automatic rifle was introduced into the Soviet armed forces. By 1959, Kalashnikov had refined the gun, reduced its weight by almost three pounds, and redesigned it to use steel stampings and other inexpensive production techniques. The *Avtomat Kalasnikova Modernizirovannyi (AKM)* was in use by 1959. More than 13 million AK47 and AKM assault rifles have been made, more than any gun in history. They've been manufactured in the USSR, the Peoples' Republic of China, all the Warsaw Pact countries, and in revised form in Israel as the Galil.

The AKM is cheap, rugged, reliable, accurate, and automatic. It uses the Soviet 7.62mm. "short" round that's not as powerful as a standard high-power rifle round but more powerful than a pistol cartridge. Nevertheless, it has an effective range of 1,000 meters. It works and works well and continues to work in the deserts of the Middle East and the jungles of Central America. Practically every terrorist, every guerrilla, and every member of a "Peoples' Militia" can be seen with the unmistakable AKM.

The AKM can be placed in the hands of untrained peasants with assurance that it will continue to work even though it's been used to pound stakes, club the enemy, dig ditches, and shovel sand. All the user must do from time to time is take the cleaning rod out of its slot under the AKM's barrel, run a patch of cloth down the bore, put the cleaning rod back, and start shooting again.

Sorry, folks, the US Army's high-technology M-16 wonder rifle doesn't cut it. Its caliber is 5.56mm. in contrast to the AKM's 7.62mm. Maintenance of the smaller barrel on the M-16 requires more care, especially in rainy weather when the bore has a greater tendency to pick up water by capillary action. A 7.62mm. AKM can be fired without too much worry in rainy weather if you haven't gotten the barrel full of mud, but you'd better check a 5.56mm. M-16 before you shoot it or the barrel is likely to lay open like a ripe banana upon firing

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the first round. The old Garand M-1 of World War II and Korea isn't the peasant's weapon, either; it's a marksmanship-oriented gun and it requires care. It throws a 150-grain .30 caliber bullet about the same as the AKM 7.62mm. 144-grain slug but with far higher muzzle velocity and therefore with greater rifle recoil.

The fact that more than 13 million Kalashnikovs have been made is testimony to the claim that it's the ultimate personal social-purpose weapon. It appears to work well without much attention being given to it. It can be dragged through slime and still work. A lot of people have been killed by AKM automatic rifles in the hands of terrorists and guerrillas. Thus, terrorism has been freed of gun control by technology.

In the Old West of the United States of America, the famed Colt revolver was known as "The Equalizer." Today, the Soviet AKM is the equalizer. No wonder there's more terrorism around. Modern technology made it feasible. And You-Know-Who has made the AKM awfully easy to get by saying, "Comrade!" Except in the United States.

One can hope the new Soviet *Avtomat Kalashnikova obr 1974* is a big hit and replaces the AKM. The AK74 is a scaled-down AKM firing a Soviet 5.45mm. round. The need to keep the smaller weapon well maintained may deter terrorists from using it, thus reinstating the only kind of gun control that history tells us really works. However, in the meantime there are millions of AKMs out there that will be worrisome for many years yet. ■

ON GAMING

(continued from page 89)

(since Al never made it to the future to tell you, right?) is another story. With Al gone, so is the memory of the nonevent. To remember it requires the use of Paranormal Memory, a skill needed by every agent of the Time Corps.

Then there are the anomalies, things whose very existence is a paradox. Suppose you discover that something bad is going to happen to you. So you hop pastwards to leave a message for yourself. But if you then read the message in the future, and avoid the bad thing, you won't need to hop back to leave the message. Hmm.

The solution? The Anomaly Field Generator. These handy (but expensive) little items generate a field that allows an anomaly to exist for a short period of time, such as the message that will never be sent. No home should be without one.

Also included is a section on new talents and skills for the role-playing game, as well as ways of integrating Timetricks into Timemaster games. It will not be easy for players to handle such things as self-eliminating missions, significance waves, and time storms, but it would be a lot of fun trying. There's even a section devoted to using tricks with titles like "Hey, Remember Me?" and "I've Been Here All the Time" as though they were the sleight of hand of a vaudeville magician.

Don't worry if you have no interest in playing the *Timemaster* game. Any fan of time travel will enjoy this book (and it certainly belongs on any SF reference shelf). Mark Acres, the author and game designer, has created that rarity in role-playing, a book-length supplement that's enjoyable to read and useful beyond the boundaries of its game system. Don't leave your parallel without it. ■

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Vernor Vinge

MAROONED IN REAL TIME

Part Two of Four

The Extinction was the greatest murder mystery of all time. Or was it?

SYNOPSIS

It seems unlikely the human race will exist a million years from now. No reasonable person would expect the race to survive fifty *million years. In that time, mountains grow old; continents split and merge. Even without war or natural catastrophe, a form such as Man should become extinct, or evolve into something different.*

Before January 2100, **Wil Brierson** *would have considered such questions a pleasant waste of time. Brierson was a private policeman—in an era when no other kind of cop existed. He had handled all types of crime, from fraud to armed invasion. His current case, an embezzlement, was comparatively trivial. But Wil got careless, and his quarry trapped him in a* **bobble**.

Inside a bobble, time is stopped. No force can affect a bobble's contents; no force can change a bobble's duration. Brierson's stasis would last 100,000

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years. When next he lived, the fate of humankind would be a deadly, immediate issue.

Marta *and* **Yelén Korolev** *entered stasis in 2201. Their departure was voluntary. They took state-of-the-art survival equipment—and by 2201, that was very good indeed. Ultimately, they expected to penetrate beyond the end of civilization.*

In that they succeeded. Easily. They discovered that the human race was not to last fifty million years, or one million, or even one hundred. *Somewhere in the twenty-third century, the human race had . . . disappeared. By the fourth millennium, Earth was a decaying mausoleum, Man's works vanishing beneath jungle and forest and sea.*

Marta and Yelén found other exiles. Some were self-sufficient, coming from the high-tech era around 2200. **Monica Raines** *thought war or pollution had killed mankind off—and good riddance.* **Juan Chanson**, *trained as an archeologist, saw strong evidence of warfare—and equally strong evidence that the attacks had come from outside the solar system. He concluded that the human race had been murdered.*

When civilization ended, there were thousands of bobbles containing humans. Most were easily documented —they had existed before the Korolevs' departure. The majority contained low-techs, people from the twenty-first and early twenty-second centuries. Some, like Wil Brierson, had been shanghaied. Others had jumped to escape punishment, or represented twenty-first century governments. Many had already fallen out of stasis and died in the ruins. The arrival times of the rest were scattered across the future. One of the largest groups, members of the infamous **Peace Authority** *from 2048, would not return for fifty million years.*

Marta Korolev had a plan. If all those in stasis could be saved, there might be enough humans left to restart the race. Through the centuries, millennia, and megayears that followed, she and Yelén rescued the returning low-techs, fought off those travelers who had turned brigand, and did their best to recruit surviving high-techs.

Fifty megayears was the grand target date, when all still alive and interested would meet, the Peacers be rescued, and humankind start again. Along the way, more high-tech travelers surfaced, including: **Philippe Genet**, **Tunç Blumenthal**, *and* **the Robinson Family**. *In the final centuries before the rescue, a space explorer returned to the solar system.* **Della Lu** *had been gone fifty million years. In appearance and behavior, she seemed scarcely human; the others guessed she had lived thousands of years in real time.*

The rendezvous was as carefully planned as any twentieth century space mission: Marta and Yelén had arranged that all previously rescued low-techs return to real time simultaneously, and had built Town Korolev to house them. The retrieval of the Peacer bobble from deep within Earth's crust was witnessed by all. Once on the surface, it would be another few thousand years before it finally burst, but now its contents would survive the return to real time. The rest of the colony would bobble up one last time, to await the Peacers' arrival.

The Korolev plan was a technical

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triumph, but the next few days brought it close to ruin. The largest group of low-tech refugees was a remnant of the **Republic of New Mexico**; *the New Mexicans had lived just decades after the Peace Authority fell, and their hatred for the Authority was undimmed. By going ahead with the rescue, Marta and Yelén made an enemy of the New Mexico president,* **Steven Fraley**. *That was a small matter compared to what followed:*

The Robinson Family made their move. Playing on the widespread hostility against the Korolevs, **Don Robinson** *began recruiting low-techs for* his *version of a new order.*

That night the colony bobbled forward, awaiting the final return of the Peacers. That "night," more than one hundred years passed in real time. That "night," someone murdered Marta Korolev. Through a subtle sabotage of the bobble management programs, Marta was left outside of stasis. She had no equipment, no health care. She lived four decades . . . and died years before anyone could save her.

Yelén Korolev hated Wil Brierson, thinking he had made advances on Marta the night of the bobbling. Nevertheless, she needed him now. Even fifty million years after the Age of Man, there was still work for a cop. His partner was to be the high-tech, Della Lu.

There was no shortage of suspects. The Robinson Family raced off to interstellar space, proclaiming their innocence but leaving only one daughter, **Tammy Robinson**, *to face the investigation. In Wil's eyes, Yelén was herself a prime suspect, one with deadly power. And there were clues, of a sort: The victim had left a diary, forty years' worth.*

Thus Wil Brierson found himself stuck at the end of time, with a partner of dubious sanity, investigating a murder that might be the work of his new employer . . . or of someone who simply wanted the human race to remain extinct.

It all seemed a steep price to pay for botching an embezzlement case back in 2100.

7

The morning of the Monica Raines interview did not begin well. Wil was still asleep when the house announced that Della Lu was waiting outside.

Wil groaned, slowly rising from the unpleasant dreams that haunted his mornings. Then he realized the time, and the day. "Sorry, sorry. I'll be right down." He rolled out of bed, and staggered into the bathroom. Who had decided on this early start anyway? Then he remembered it had been himself; something about time zones.

Even downstairs, he was still a bit foggy. He grabbed a box lunch from the kitchen. The bright colors on the package were advertising fifty million years old. When Korolev said she was providing twenty-first century support, she meant it. The autofactories were running off the same programs as the original manufacturers. The effect was more weird than homey. He tucked the lunch into his shoulder bag along with his data set. Something in the back of his mind was saying he should take more; after all, he was going a third of the way around the world today. He shook his head. Sure, and he'd probably be back

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in five hours. Even the lunch was unnecessary. Wil gave final instructions to the house, and stepped into the morning coolness:

It was the sort of morning that should change the ways of night owls. Green loomed high around the house, the trees glistening damply in the sun. Everything felt clean and bright, just created. Except for the birds, it was quiet. He walked across the mossy street toward Lu's enclosed flier. Two protection devices—one from Yelén and one from Della—left their posts above his house and drifted along with him.

"Hey, Wil! Wait a minute." Dilip Dasgupta waved from his house, fifty meters down the road. "Where are you going?"

"Calafia," Brierson called back.

"Wow." Rohan and Dilip were both up and dressed. They jogged down the road to him.

"This part of the murder investigation?" said Dilip.

"You look awful, Wil," said Rohan.

Brierson ignored Rohan. "Yeah. We're flying out to see Monica Raines."

"Ah! A suspect."

"No. We're still fact-finding, Dilip. I want to talk to all the high-techs."

"Oh." He sounded like a football fan disappointed by his team's hard luck. A few days earlier, the disappointment would have been edged with fear. Everyone had been edgy then, guessing that Marta's murder might be the prelude to a massive assault on the settlement.

"Wil, I mean it." Rohan was not to be sidetracked. "You really look dragged out. And it's not just this morning, so early and all. Don't let this case shut you off from your friends. You gotta mingle, Wil . . . like, this morning we're going on a fishing expedition off North Shore. It's something the Peacers organized. That Genet fellow is coming along in case we run into anything too big to handle. You know, I don't see why Governments got such a bad name. Both the Peacers and the New Mexicans aren't much different from social clubs or college fraternities. They've been real nice to everybody."

"Yes, and face it, Wil, we're starting new lives here. Most of the human race is tied up in those two groups now. There are lots of women there, lots of people you'd like to know."

Brierson grinned, embarrassed and a little bit touched. "You're right. I should keep up with things."

Rohan reached up to slap him on the shoulder. "Hey, if you get back in the afternoon, you might have the Lu person drop you off at North Shore. I bet there'll still be something going."

"Okay!" Wil turned and walked toward Lu's aircraft. The Dasguptas were right about the big things. How wrong they were about the little ones: a smile came back to his lips as he imagined Steve Fraley's reaction to hearing the Republic of New Mexico likened to a social club.

"Good morning, Wil." Lu's face was impassive. She seemed not at all impatient at the delay. "Is 1.5 g's okay?"

"Sure, sure," Brierson settled into a chair, not quite sure what she was talking about. At least he didn't have to worry about *her* questioning his mood. Short of laughter or smiles or

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tears, she still seemed incapable of reading facial expressions.

He sank slowly into the seat cushions as the flier's acceleration added a physical lassitude to his mental one. He'd been using the GreenInc database for more than the investigation of Marta's murder. Last night he'd tracked his family to the end of the twenty-second century. He was proud of what his children had become: Anne the astronaut, Billy the cop and later the story-maker. As far as he could tell, Virginia had never remarried. The three of them had disappeared into the twenty-third century, along with his parents, his sister, and all the rest of humanity.

In 2140 and 2180 they had bobbled gifts to accompany him. GreenInc said it was the best survival equipment their money could buy. It had all been lost to the graverobbers, the gang of scavenging travelers that existed in the first megayears after Man. Perhaps that was just as well. There would have been family video in those care packages. That would have been very hard to view.

. . . But all along he'd had the secret dream that Virginia might come after him herself, at least when the kids had their own families. It was strange: He would have pleaded with her not to come, yet now he felt . . . betrayed.

The faint whistling from beyond the windows had long faded, but the gut-tugging acceleration continued. Wil's attention returned to the flier. He looked straight out. Cloud-speckled ocean stood like a blue wall beside them. He looked up through the transparent dome—and saw the curve of the Earth, pale blue meeting the black of space. They were hundreds of klicks up, driving forward at a steady acceleration that was nothing like the ballistic trajectories he was used to.

"How long?" he managed to say.

"It is slow, isn't it?" Della said. "Now that the settlement is founded, Yelén doesn't want us to use nukes in near space. At this acceleration, it'll be another half hour to North America."

An island chain trundled rapidly across his field of view. Much nearer, he saw the autons that protected him at home; the two flew formation with Della's craft.

"I still don't understand why you want to go out of your way to interview Ms. Raines. How is she special?"

Wil shrugged. "I like to do the reluctant ones first. She's not interested in coming back in person, and I want these interviews to be face-to-face."

Della said, "That's wise. Most of us could do almost anything on a holo channel . . . But she's one of the least powerful of the high-techs. I can't imagine her as the killer."

A few minutes later, Della turned the flier over. It was a skew turn that for a moment had them accelerating straight down into the Pacific. Wil was glad there had not been time for breakfast. When they entered the atmosphere off the west coast of Calafia, they were moving barely fast enough to put a glow in the flier's hull.

Calafia. It was one of the Korolevs' more appropriate namings. In Wil's time, one of the clichés of regional insult was the prediction that California would one day fall into the sea. It never happened. Instead, California had *put* to sea, sliding along the San Andreas

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fault, earthquake by earthquake, millennium after millennium—till the southwest coast of North America became a 1500 kilometer island. It was indeed Calafia, the vast, narrow island that Spanish mariners had (prematurely) identified fifty million years earlier.

Della covered the last few hundred kilometers in a low approach. The beach passed quickly beneath. North and south, for as far as he could see, breakers marched on perfect sand. Nowhere was there town or road. The world was in an interglacial period now, much as in the Age of Man. That coastline really *did* look like California's. It didn't raise the same nostalgia as Michigan might, but he felt his throat tighten nevertheless. He and Virginia had often visited Southern California in the 2090s, after the disgovernance of Aztlán.

They scudded over hills mantled with evergreens. Afternoon sunlight cast everything in jagged relief. Beyond the hills, the vegetation was sere and grayish green. Beyond that was prairie and the Calafia straits.

"Okay. So what dumb questions do you want to ask?" Monica Raines did not look back as she led them down to her—blind, she called it. Wil and Della hurried after her. He was not put off by the artist's brusqueness. In the past, she'd made no secret of her dislike for the Korolevs and their plans.

The wood stairs descended through tree-shrouded dimness. The smell of mesquite hung in the air. At the bottom, invisible among vines and branches, was a small cabin. Its floor was deeply carpeted, with pillows scattered about. One side of the room had no wall, but overlooked the beginning of the plainsland. A battery of equipment —optics?—was mounted at the edge of this open side.

"I'd appreciate it if you'd keep your voices down," said Monica. "We're less than one hundred meters from the starter nest." She fiddled with the equipment; she was not wearing a headband. A display flat lit with the picture of two . . . vultures? They strutted around a small pile of stones and brush. The picture was wavery with heat shimmers. Wil sighted over the optics: Sure enough, he could just make out two birds in the valley below the blind.

"Why use a telescope?" Lu asked softly. "With tracer cameras, you could—"

"Yeah, I use them, too. Gimme remotes," she said to the thin air. Several other displays came to life. The pictures were dim even in the darkened room. "I don't like to scatter tracers all around; they mess up the environment. Besides, I don't have any good ones left." She jerked a thumb at the main display. "If you're lucky, these dragon birds are gonna give you a real show."

Dragon birds? Wil looked again at the misshapen bodies, the featherless heads and scrawny necks. They still looked like vultures to him. The dun-colored creatures strutted round and round the pile, occasionally puffing out their chests. Off to one side, he saw a smaller one, sitting and watching. The strangest thing about them was the bladelike ridge that ran across the top of their beaks.

Monica sat cross-legged on the floor. Wil sat down more awkwardly, and punched up some notes on his data set. Della Lu remained standing, drifting

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around the room, looking at the pictures on the wall. They were famous pictures: "Death on a Bicycle," "Death Visits the Amusement Park"—They'd been a fad in the 2050s, at the time of the longevity breakthrough, when people realized that but for accidents or violence, they could live forever. Death was suddenly a pleasant old man, freed from his longtime burden. He rolled awkwardly along on his first bicycle ride, his scythe sticking up like a flag. Children ran beside him, smiling and laughing. Wil remembered the pictures well; he'd been a kid himself then. But here, fifty million years after the extinction of the human race, they seemed more macabre than cute.

Wil pulled his attention back to Monica Raines. "You know that Yelén Korolev has commissioned Ms. Lu and me to investigate the murder. Basically, I'm to provide the old-fashioned nosing around—like in the detective stories—and Della Lu is doing the high-tech analysis. It may seem frivolous, but this is the way I've always operated: I want to talk to you face-to-face, get your thoughts about the crime." *And try to find what motive and method you might have for murder*, he didn't say; Wil's approach was as nonthreatening and casual as possible. "This is all voluntary. We aren't claiming any contractual authority."

The corner of Raines's mouth turned down. "My thoughts about the crime, Mr. Brierson, are that I had nothing to do with it. To put it in your detective jargon: I have no motive, as I have no interest in the Korolevs' pitiful attempt to resurrect mankind. I had no opportunity, as my protection equipment is much more limited than theirs."

"You are a high-tech, though."

"Only by the era of my origin. When I left civilization, I took the bare necessities for survival. I didn't bring software to build autofactories. I have air/space capability and some explosives, but they're the minimum needed to exit stasis safely." She gestured at Lu. "Your high-tech partner can verify all this."

Della dropped bonelessly to a cross-legged position, and propped her chin on her hands. For an instant she looked like a young girl. "You'll give me access to your databases?"

"Yes."

The spacer nodded, and then her attention drifted away again. She was watching the picture off the telescope. The dragon birds had stopped their strutting. Now they were taking turns *throwing* small rocks into the nest-like structure between them. Wil had never seen anything like it. The birds would hunt about at the edge of the pile of stones and brush. They seemed very selective. What they grasped in their beaks glittered. Then, with a quick flip of the head, the pebble was cast into the pile. At the same time, the thrower flapped briefly into the air.

Raines followed Della's glance. The artist's face split with a smile less cynical than usual. "Notice how they face downwind when they do that."

"They're fire makers?" asked Lu.

Raines' head snapped up. "You're the spacer. You've seen things like this before?"

"Once. In the LMC. But they weren't . . . birds, exactly."

Raines was silent for a moment. Curiosity and wonder seemed to battle

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against her natural desire to remain one-up on her visitors. The latter won, but she sounded friendlier as she continued, "Things have to be just right before they'll try. It's been a dry summer, and they've built their starter-pyre at the edge of an area that hasn't burned in decades. Notice that there's a good breeze blowing along the hillsides."

Lu was smiling now, too. "Yes. So that flapping reflex when they throw—that's to give the sparks a little help?"

"Right. It can be—oh, look, look!" There wasn't much to see. Wil had noticed a faint spark when the last pebble struck the rocks in the nest—the starter-pyre, Monica called it. Now a wisp of smoke rose from the straw that covered the leeward side of the pile. The vulture stayed close to the smoke, moved its wings in long sweeps. Its rattling call echoed up the ravine. "Nope. It didn't quite catch . . . Sometimes the dragon's *too* successful, by the way. They burn like torches if their feathers catch fire. I think that's why the males work in pairs: one's a spare."

"But when the game works—" said Lu.

"When the game works, you get a nice brush fire sweeping away from the dragon birds."

"How do they benefit by starting fires?" asked Wil; he already had a bad feeling he knew the answer.

"It makes for good eating, Mr. Brierson. These scavengers don't wait for lunch to drop dead on its own. A fire like this can spread faster than some animals can run. After it's over, there's plenty of cooked meat. Those beak ridges are for scraping the char off their prey. The dragons get so fat afterwards, they can barely waddle. A good burn marks the start of a really successful breeding season for them."

Wil felt a little sick. He'd watched nature films all the way back to the flat-screen Disneys, but he never could accept the talk about the beauty and balance of nature—when illustrated by grotesque forms of sudden death.

Things got worse. Della asked, "So they get mainly small animals?"

Raines nodded. "But there are a few interesting exceptions." She brought another display to life. "These pictures are from a camera about four thousand meters east of here." The picture jogged and bounced. Wil glimpsed shaggy creatures rooting through dense brush. They were built low to the ground, yet seemed vaguely apelike.

"Marvelous what the primates can become, isn't it? The design is so multipurpose, so *centered*. Except for one disastrous dead end, they are by far the most interesting of the mammals. At one time or another, I've seen them adapt to almost every slot available for large land animals, and more: the fishermonkeys are almost in the penguin slot. I'm watching them very closely; someday they may become exclusively water animals." Enthusiasm was bright on her normally saturnine features.

"You think mankind *devolved* into the fishermonkeys and these . . . things?" Wil pointed at the display. He couldn't keep the revulsion from his voice.

Raines sniffed. "That's absurd. And presumptuous, really. Homo sapiens was about the most self-deadly variation in the theme of life. The species insu-

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lated itself from physical stress for so long that what few individuals survived the destruction of technology would have been totally unable to live on their own. No, the present-day primates are descended from those in wilderness estates at the time mankind did itself in."

She laughed softly at the look on Wil's face. "You have no business making value judgments on the dragons, Mr. Brierson. Theirs is a beautiful variation. It's survived half a million years—almost as long Man's experiment with fire. The starter-pyres began as little piles of glitter, a kind of sexual display for the males. The first fires were accidental, but the adaption has been refined over hundreds of thousands of years. It doesn't provide them with all their food, or even most of it. But it's an extra advantage. As a mating ritual, it even survives climatic wet spells. When summers are dry again, it is still ready to use.

"This is how fire was meant to be used, Mr. Brierson. The dragons have little impact on the average tonnage burned; they just redistribute the fires to their advantage. Their way is self-limiting, fitting the balance of nature. Man perverted fire, used it for unlimited destruction."

Every one crazier than the last, thought Wil. Monica Raines sat surrounded and served by the fruits of that "perversion," and all she could do was bitch. She sounded like something out of the twentieth century. "So you don't believe Juan Chanson's theory that man was exterminated by aliens?"

"There's no need for such an invention. Can't you see, Mr. Brierson? The trends were all there, undeniable. Mankind's systems grew more and more complicated, their demands more and more rapacious. Have you seen the mines the Korolevs built west of the Inland Sea? They stretch for dozens of kilometers—open pits, autons everywhere. By the late twenty-second century, *that's* the scale of resources demanded by a single individual. Science gave each human animal the presumption to act like a little god. The Earth just couldn't take it. Hell, I'll bet there wasn't even a war. I'll bet the whole structure collapsed under its own weight, leaving the rapists at the mercy of their victim—nature."

"There's the asteroid belt. Industry could be moved off-planet." In fact, Wil had seen the beginnings of that in his time.

"No. This was an exponential process. Moving into space just postponed the debacle a few decades." She rose to her knees and looked at the telescope display. The vultures had resumed their slow strutting about the rock pile. "Too bad. I don't think we'll get a fire today. They try hardest in the early afternoon."

"If you feel this way about humans, why are you out of stasis just now?" said Lu.

Wil added, "Did you think you could persuade the new settlement to behave more . . . respectfully toward nature?"

Raines made one of her turned-down smiles. "Certainly not. You haven't seen any propaganda from me, have you? I couldn't care less. This settlement is the biggest I've seen, but it will fail like all the others, and there will be peace on Earth once more. I, um . . . it's just a coincidence we're all out of stasis at the same time." She hesitated. "I—I

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am an artist, Ms. Lu. I use the scientist's tools, but with the heart of an artist. Back in civilization, I could see the Extinction coming: there would be no one left to rape nature, but neither would there be anyone to praise her handiwork.

"So I proceed down through time, averaging a year alive in each megayear, making my pictures, taking my notes. Sometimes I stay out for just a day, sometimes for a week or a month. The last few megayears, I've been very active. The social spiders are fascinating, and now—just in the last half million years—the dragon birds have appeared. It's not surprising that we all should be living at the same time."

There was something fishy about the explanation. A year of observing time spread through a million years left an awful lot of empty space. The settlement had only been active for a few months. The odds against meeting her seemed very high. Raines sat uneasily, almost fidgety under his gaze. She was lying, but why? Wil smiled sadly; the obvious explanation was certainly an innocent one. For all her hostility, Monica Raines was still a human being. Even if she could not admit it to herself, she still needed others to share the things she did.

"But my staying is no coincidence, Mr. Brierson. I've got my pictures; I'm ready to go. Besides, I expect the next few centuries—the time it takes you people to die off—will be ugly ones. I'd be long gone except for Yelén. She demands I stay in this era. She says she'll drop me into the sun if I bobble up. The bitch." Apparently Raines didn't have as much firepower as the Robinsons. Wil wondered if any of the other high-techs were staying under duress. "So you can see why I'm willing to cooperate. Get her off my back."

Despite the sour words, she was eager to talk. She showed them her video of the early dragon birds, back when starting fires was almost an accident. In her fifty-year voyage she had created archives that would have shamed the national libraries of the twentieth century. And Don Robinson was not the only one who had home movies. Monica's automation could rearrange her data into terrifying homotopies, where creatures caught in the blowtorch of time flowed and melted from one form to another. She seemed determined to show them all, and Della Lu, at least, seemed willing to watch.

When they left the blind, deep twilight was spread across the grassland. Raines accompanied them to the top of her little canyon. A dry, warm wind rattled through the chaparral; the dragon birds should have no trouble starting their fire if the weather stayed like this. They stood for a moment at the top of the ridgeline. They could see for kilometers in all directions. Bands of orange and red crossed the western horizon. A hint of green lay above that, then violet and starry blackness. Nowhere was there a single artificial light. Something like honey floated in the breeze.

"It's beautiful, isn't it?" Raines said softly.

Untouched forever and ever. Could she really want that? "Yes, but someday intelligence will evolve again. Even if you're right about humanity, the world won't stay peaceful forever."

She didn't answer immediately. "It could happen. There are a couple of

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species that seem to be at the brink of sentience—the spiders for one." She looked back at him, her face lit by the twilight band. Was she blushing? Somehow, his question had hit home. "If it happens . . . well, I'll be here, right from the beginning of their awareness. I'm not against intelligence by itself, just the abuse of it. Perhaps I can nudge them away from the arrogance of my race." Like an elder god, leading the new creatures in the way of the right. Monica Raines would find people who could properly appreciate her—even if she had to help in their creation.

Lu's flier drove steadily back over the Pacific. The sun rose swiftly from around the shoulder of the Earth. According to his data set it was barely noon in the Asian time zone. The bright sunlight and blue sky (which was really the Pacific below) made such an emotional difference. Just minutes ago all had been darkness and poor Monica's murky thoughts.

"Crazies," said Wil.

"What?"

"All these advanced travelers. I could go a year in police work and not meet anyone as strange: Yelén Korolev, who seems to be jealous of me just for liking her girlfriend, and who moped alone for a century after we jumped forward; cute little Tammy Robinson—who is old enough to be my mother—and whose object in life is to celebrate New Year's at the end of time; Monica Raines, who would make a twentieth century ecofanatic look like a strip-miner." *And then there's Della Lu, who has lived so long she has to study to seem human at all.*

He stopped short and looked guiltily at Della. She grinned knowingly at him, and the smile seemed to reach all the way to her eyes. Damn. There were times now she seemed totally aware. "What do you expect, Wil? We were all a little strange to begin with; we left civilization voluntarily. Since then, we have spent hundreds—sometimes thousands—of years getting here. That takes a power of will you would call monomania."

"Not all the high-techs started out crazy. I mean . . . your original motive was short range exploration, right?"

"By your standards it wasn't short range. I had just lost someone I cared about very much; I wanted to be alone. The Gatewood's Star mission was a 1200 year round-trip. By the time I got back, I had overshot the Singularity —what Monica and Juan call the Extinction. That's when I left on my really long missions. You've missed all the reasonable high-techs, Wil. They settled down in the first few megayears after Man and made the best of it. You're left with *la crud de la crud,* so to speak."

She had a point. The low-techs were a lot easier to talk to. Wil had thought that a matter of culture similarity, but now he saw that it went deeper. The low-techs were people who had been shanghaied, or had short term goals (like the Dasguptas and their foolish investment schemes). Even the New Mexicans, who had an abundance of unpleasant notions, had not spent more than a few years in real time since leaving civilization.

Okay, so all the suspects were nuts.

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The problem was to find the nut that was also rotten.

"What about Raines? For all her talk of indifference, she's clearly hostile to the Korolevs. Perhaps she killed Marta just to speed up the 'natural process' of the settlement's collapse."

"I don't think so, Wil. I snooped around while we were talking with her. She has good bobbling equipment, and enough automation to run her observation program, but she's virtually defenseless. She doesn't have the depth to fool the Korolev scheduling programs. . . . In fact, she's terribly underequipped. If she keeps living a year per megayear, she won't last more than a couple hundred megayears before her autons begin to fail. Then she's going to find out about nature first hand. —You should compliment me, Wil; I'm following your advice about the interviews. I didn't laugh when she started on peace and the balance of nature."

Brierson smiled. "Yes. You were a good co-interrogator . . . but I don't think she plans on traveling to forever. Her real goal is to play god to the next intelligent race that evolves on Earth."

"The *next* intelligent race? Then she doesn't realize how rare intelligence is. You may think those fire-making birds are freaks, but let me tell you something: such developments are a thousand times more common than the evolution of intelligence. Chances are the sun will go red giant long before intelligence reappears on Earth."

"Hmm." He was scarcely in a position to argue. Della Lu was the only living human, perhaps the only person in history, who really knew about such things. "Okay, so she's unrealistic . . . or maybe she's hiding her true resources, at the Lagrange zones or simply in the wilderness. Can you be sure she's not playing dumb?"

"Not yet. But when she gives me access to her records, I'll run consistency checks. I have faith in my automation. Raines left civilization seven years before me. Whatever automation she took, mine is better. If she's hiding anything, I will know."

One less suspect, probably. That was a sort of progress.

They flew silently for several minutes, the blue of the Earth on one side, the sun sliding down the other. He could see one of the protection autons, a bright fleck floating against faraway clouds.

Perhaps he should take the afternoon off, go to the Peacer meeting at North Shore. Still, there was something about Monica Raines. "Della, how do you think Raines would feel if the settlement were a success? Would she be so indifferent to us if she thought we might do permanent damage?"

"I think she would be surprised, and very angry . . . and impotent."

"I wonder. Let's suppose she doesn't have the usual high-tech battle equipment. If she simply wanted to destroy the settlement, she might not need anything spectacular: perhaps a disease, something with a long incubation period."

Lu's eyes widened almost comically. He had noticed the same mannerism in Yelén Korolev. It had something to do with their direct data interface: when confronted with a surprising question demanding heavy analysis, they seemed first startled and then dazed. Several seconds passed. "That's just barely pos-

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sible. She has a bio-science background, and a small autolab would be hard to spot. Korolevs' medical automation is good, but it's not designed for warfare—''

She smiled. ''That's an interesting idea, Wil. A properly designed virus could evade the panphages and infect everyone before any symptoms appeared. Bobbling out of the area would be no defense.''

''Interesting'' was not the word Brierson would have used. The diseases spread after the 1997 war had killed most of the human race. Even in Wil's time, less than forty million people lived in North America. By then the terror was gone, and the world was a friendly place, but still—better bombs and bullets than bugs. He licked his lips. ''I suppose we don't have to worry about it immediately. She must know how deadly the high-tech response would be. But if our settlement is *too* successful—''

''Yes. I've put this on my list. Now that we're aware of the possibility, it shouldn't be hard to guard against. I have exploration-duty medical equipment. It's smart and very paranoid.''

''Yeah.'' *Nothing to worry about, Wil.* They had lost a murder suspect—and possibly gained a genocidal maniac.

8

Wil didn't make it to the party at North Shore.

At first, the Raines thing had him wound up, and then—well, someone had killed Marta. Most likely that someone wanted the settlement to fail. And he was no nearer cracking the case today than a week ago. Parties would have to wait.

He meshed his data set with the house archives. He could have used the house displays direct, but he felt more at ease with his portable. . . . Besides, it was one of the few things that had come with him through time. Its memory was an attic filled with a thousand private souvenirs; the date it displayed, 16 February 2100, was when he would be if his old life had continued.

Wil heated his lunch pack and munched absent-mindedly at hot vegetables as he scanned his progress. Wil was behind in his reading: just another good reason to stay home this afternoon. Most people outside police work didn't realize how much of criminal investigation involved drawing conclusions from databases—usually public databases, at that. Wil's ''reading'' was the most likely source of real evidence. There was no shortage of things to look at. His house archive was far bigger than any other low-tech's. In addition to the 2201 edition of GreenInc, he had copies of parts of Korolev's and Lu's personal databases.

Wil had insisted on having his own copies. He didn't want networked stuff. He didn't want it changing mysteriously depending on the whim of the original owners. The price of such independence was a certain incoherence. His own processors had to accommodate idiosyncrasies in the structure of the imported data. With Yelén's stuff it wasn't too bad. It was designed both for headband users and for old-fashioned query languages. Her engineering jargon was sometimes incomprehensible, but he could get by.

Della's dbs were a different story. Her copy of GreenInc was a year more

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recent than Yelén's, but a note announced that the later parts had been severely damaged during her travels. That was an understatement. Whole sections from the late twenty-second were jumbled or just plain missing. Her personal database appeared to be intact, but used a customized headband design. His processors found it almost impossible to talk to the retrieval programs. Usually the output seemed to be allegorical hallucinations; occasionally he was blocked by the fragments of a personality simulator. Not for the first time in his life, Wil wished he could use interface headbands. They had existed in his time. If you had great native intelligence and a certain turn of imagination, they made computers a direct extension of your mind; otherwise, the bands were little more than electronic drug-tripping. Wil sighed. Yelén said the headbands from her era were easier to use; if only she had given him the time to learn how.

Della had nine thousand years of exploration packed away in her database. He'd had tantalizing glimpses—a world where plants floated in the sky, pictures of stars crowding close about something dark and *visibly* moving, a low-orbit shot of a planet green and cratered. On one planet, bathed in the glow of a giant red sun, he saw something that looked like ruins. Nowhere else had he seen any sign of intelligence. Was it so rare that all Della ever saw were ruins or fossils of ruins—of civilizations lasting a few millennia, and missed by millions of years? He hadn't yet asked her about what she'd seen. The murder was their immediate business, and until recently she'd been difficult to talk to. But now that he thought about it, she was awfully closed-mouthed about her travels.

His other researches were going better. He'd studied most of the high-techs. None of them—except Yelén and Marta—had any special relationship back in civilization. The conclusion couldn't be absolute, of course. The biography companies only had so many spies. If someone was hiding something, and was also out of the public eye, then that something could stay hidden.

Philippe Genet was the least documented. Wil couldn't find any reference to him before 2160, when he began advertising his services as a construction contractor. At that time, he was at least forty years old. You'd have to live like a hermit or have lots of money to go forty years and not get on a junk mail list or have a published credit rating. There was another possibility: perhaps Genet had been in stasis before 2160. Wil had not pursued that very far; it would open a whole new tree of investigation. Between 2160 and the time Genet left civilization in 2201, the trail was sparse but visible. He had not been convicted of any crimes that involved public punishment. He hadn't been seen at public events, or written anything for public scrutiny. From his advertising—and the advertising that was focused back on him—it was clear that his construction business was successful, but not so successful as to attract the attention of the trade journals. Consumer ratings of his product were solid but not spectacular; he came out low in "customer relations." In the 2190s, he followed the herd and began specializing in space construction. Nowhere could Wil find anything that might be a motive. However, with his construction background, Genet was probably one of the best-armed of the travelers.

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Genet's conservative, quiet background hardly seemed to fit jumping into the future. He was a must for an early interview; at the least, it would be nice to meet a high-tech who was not a crazy.

In terms of documentation, Della Lu was at the other extreme. Brierson should have recognized her name the first time he heard it, even attached to its present owner. That name was important in the history books of Wil's childhood. If not for her, the 2048 revolt against the Peace Authority would have been a catastrophic failure.

Wil had just reread the history of that war. To the Peacers, Lu was a secret police cop who had infiltrated the rebels. In fact, it was the other way around: During the rebel assault on Livermore, Della Lu was stationed at the heart of the Peacer command. Right under her bosses' noses she bobbled the Peace's command center and herself. End of battle; end of Peace Authority. The rest of their forces surrendered, or bobbled themselves. The Peacers now living on North Shore had been a secret Asian garrison designed to take the war into the future; unfortunately for them, they took it a little too *far* into the future.

What Della did took guts. She had been surrounded by the people she betrayed; when the bobble burst she could expect little better than a quick death.

All that had happened in 2048, two years before Wil was born. He could remember, as a kid, reading the histories and hoping that some way would be found to save the brave Della Lu when the Livermore bobble finally burst. Brierson hadn't lived to see that rescue. He was shanghaied in 2100, just before Della came out of stasis. His entire life in civilization had passed in what was no time at all to Della Lu.

Now he could view the rescue, and follow Lu through the twenty-second century. From the beginning, she was a celebrity. The biographers paid their *paparazzi*, and no part of her life was free of scrutiny. How much she had changed. Oh, the face was the same, and the twenty-second century Della Lu often wore her hair short. But there was a precision and a force to her movements then. She reminded Wil of a cop, even a soldier. There was also humor and happiness in the recordings, things the present Lu seemed to be relearning. She'd married a Tinker, Miguel Rosas—and here Wil recognized the model for the personality simulator he'd found in Della's database. In the 2150s, they'd been famous all over again, this time for exploring the outer solar system. Rosas died on their expedition to the Dark Companion. Della had left civilization for Gatewood's Star in 2202.

Wil finished lunch, letting the display roll through the bio summaries he'd constructed so far. It was an ironic thing, impossible before the invention of the bobble: Della Lu was an historical figure in his past, yet *he* was an historical figure in hers. She'd mentioned reading of him after her rescue, admiring someone who had "single-handedly stopped the New Mexican incursion." Brierson smiled sourly. He'd just been at the right place and the right time. If he hadn't been there, the invasion would have ended a little later, a little more bloodily; it was people like Kiki van Steen and Armadillo Schwartz who really stopped the invasion of Kansas.

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All through his police career, his company had hyped Wil. It was good for business, and usually bad for Wil. The customers seemed to expect miracles when W.W. Brierson was assigned to their case. His reputation almost got him killed during the Kansas thing. *Hell. Fifty million years later, that propaganda is still haunting me.* If he'd been just another policeman, Yelén Korolev might never have thought to give him this case. What she needed was a real investigator, not an enforcement type who had been promoted beyond all competence.

So what if he "knew" people? It scarcely seemed to help here. He had plenty of suspects, plenty of motives, and no hard facts. GreenInc was big and detailed; there were hundreds of possibilities he should look into. But what would get him closer to finding Marta's killer?

Wil put his head in his hands. Virginia had always said it was healthy for a person to wallow in self-pity every once in a while.

"You have a call from Yelén Korolev."

"Ug." He sat back. "Okay, House. Put her on."

The conference holo showed Yelén sitting in her library. She looked tired, but then she always looked tired these days. Wil restrained the impulse to brush at his hair; no doubt he looked equally dragged out.

"Hello, Brierson. I just talked to Della about Monica Raines. You've eliminated her as a suspect."

"Uh, yes. But did Della tell you that Raines might be—"

"Yeah, the biowar thing. That's . . . good thinking. You know, I told Raines I'd kill her if she tried to bobble out of this era. Now I wonder. If she's not a suspect in the murder and yet is a threat to the settlement, perhaps *I* should 'persuade' her to take a jump—at least a megayear. What do you think?"

"Hmm. I'd wait till we've studied her personal database. Lu says she can protect us against biological attack. In any case, I don't think Raines would try something unless mankind looks like a successful rerun. It's even possible she'd be more of a threat to humanity a million years from now."

"Yeah. I can't be absolutely sure of our own dispersion in time. I hope we're successfully rooted here, but—" She nodded abruptly. "Okay. That scheme is on hold. How's the investigation going otherwise?"

Brierson suggested Lu survey the weapon systems of the advanced travelers, and then outlined his own efforts with GreenInc. Korolev listened quietly. Gone was the blazing anger of their original confrontation. In its place was a kind of dogged determination.

When he finished, she didn't look pleased, but her words were mild. "You've spent a lot of time searching the civilized eras for clues. That's okay; after all, we come from there. But you should realize that the advanced travelers—excepting Jason Mudge—have lived most of their lives *since* the Singularity.

"At one time or another, there were about fifty of us. Physically we were independent, living at our own rates. But there was communication; there were meetings. Once it became clear that the rest of humanity was gone, all

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of us had our plans. Marta said it was a loose society, maybe a society of ghosts. And it got smaller and smaller. The high-techs you see now are the hard cases, Inspector. The overt criminals, the graverobbers, were killed thirty million years ago. The easy-going travelers, like Bil Sánchez, dropped off early. People would stop for a few hundred years, and try to start a family or a town: you could have a whole world for the stopping. Most we never saw again, but then sometimes a group—or parts of it—would appear megayears downtime. Our lives are threaded loosely around one another. You should be studying my personal databases about that, Brierson."

"Hmm. These early settlements—they all failed. Was there evidence of sabotage?" If Marta's murder was part of a pattern—"

"That's what I want *you* to look for, Inspector." A little of the old scorn appeared. "Till now I never thought so. From the standpoint of the dropouts, they weren't all failures. Several couples simply wanted to live their lives stopped in one era. Modern health care can keep the body alive a very long time; we discovered other limits. Time passes, personalities change. Very few of us have lived more than a thousand years. Neither our minds nor our machines last forever. To reestablish civilization, you need the interactions of many people, you need a good-sized gene pool and stability over several generations of population growth. That's almost impossible with small groups—especially when everyone has bobblers and every quarrel has the potential for breaking up the settlement."

Yelén leaned forward abruptly. "Brierson, even if Marta's murder is not part of a conspiracy against the settlement—even then, I-I'm not sure if I can hold things together."

Yelén really had changed. He had never expected her to come crying on *his* shoulder. "The low-techs won't stay in this era?"

She shook her head. "They have no choice. You're familiar with the Wáchendon suppressor field?"

"Sure. No new bobbles can be generated in a suppressor field." The invention had cost as many lives as it had saved, since the field made it impossible to escape the weapons that burn and maim.

Yelén nodded. "That's close enough. I've got most of Australasia under a Wáchendon field. The New Mexicans and the Peacers and the rest of the low-techs are stuck in this era until they discover how to counter the field. That should take at least ten years. We hoped they'd put down roots and be willing to stay by then." Yelén stared at the pink marble of her library table. "And the plan would work, Inspector," she said softly, taking her turn at self-pity. "Marta's plan would work if it weren't for those god-damned statist bastards."

"Steve Fraley?"

"Not just him. The top Peacers—Kim Tioulang and his gang—are as bad. They just won't cooperate with me. There are 101 NMs and 115 Peacers. That's better than two-thirds of the settlement. Fraley and Tioulang think they *own* their groups. The hell of it is, the rank and file seem to agree! It's twentieth century insanity, but it makes them powerful beyond all reason. They both

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want to run the whole show. Have you noticed their recruiting? They want the rest of the low-techs to become their 'citizens.' They won't be satisfied till one is supreme. I've read about old-time wars that went on for decades. They may reinvent high-tech just for the privilege of breaking up the settlement."

"Have you talked about this with the other high-techs?"

She rubbed nervously at her chin. *If only Marta were here*; the words all but spoke themselves. "A little, but most of 'em are more confused than I. Della was some help; she actually *was* a statist once. But she's hard to talk to. Have you noticed? She shifts personalities like clothes, as though she's trying to find something that fits.

"Inspector, you don't go back quite as far as Della, but there were still governments in your time. Hell, you caused the collapse of one of them. How can this sort of primitivism be successful now?"

Brierson winced. So now he had caused the disgovernance of New Mexico, had he? Wil sat back and—just like in the old days—tried to come up with something that would satisfy the inflated expectations of his customer. "Yelén, I agree that governments are a form of deception—though not necessarily for the rulers, who usually benefit from them. Most of the citizens, most of the time, must be convinced that the national interest is more important than their own. To you this must seem like an incredible piece of mass hypnotism, backed up by the public disciplining of dissenters."

Yelén nodded. "And the 'mass hypnotism' is the important thing. Any time they want, the NM rank and file could just give Fraley the finger and walk away; he couldn't kill 'em all. Instead they stay, his tools."

"Yes, but in a way this gives *them* power, too. If they walk, where's to go? There are no other groups. There is no ungoverned society like in my time."

"Sure there is. The Earth is empty, and almost a third of the low-techs are ungovs. There's nothing to keep people from settling down to their own interests."

Wil shook his head, surprised at his own insight, surprised at his voicing it to Yelén. Before, he wouldn't have thought to argue with her. But she seemed sincerely interested in his opinion. "Don't you see, Yelén? There are no ungoverned now. There are the Peacers, the NMs—but over all the low-techs there is the government of Yelén Korolev."

"What? I am *not* a government!" Red rose in her face. "I don't tax. I don't conscript. I only want to do what's right for people." Even if she was changed, at that moment Wil was glad for Lu's auton hovering above his house.

Wil chose his next words carefully. "That's all true. But you have two of the three essential attributes of government: First, the low-techs believe—correctly, I think—that you have the power of life and death over them. Second, you use that belief—however gently—to make them put your goals ahead of theirs."

It was pop social science from Wil's era, but it seemed to have a real effect on Korolev. She rubbed her chin. "So you figure that, at least subconsciously,

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all the low-techs feel they have to choose sides?"

"Yes. And as the most powerful governing force, you could easily come out the most distrusted."

"What is your advice then?"

"I, uh—" Wil had painted himself into a corner. *Yes. Suppose I'm right. What then?* The little settlement at fifty megayears was totally different from the society of Wil's time. It was entirely possible that without Korolev force, the tiny handful of seeds collected here would be blown like a cloud of dandelions down the winds of time. And separately, those seeds would never bloom.

Back in civilization, Wil had never thought much on "great issues." Even in school, he hadn't liked nitpicking arguments about religion or natural rights. The world made sense and seemed to respond appropriately to his actions. Since he had lost Virginia, everything was so terribly on its head. Could there really be a situation so weird that he would advocate government? He felt like a Victorian pushing sodomy.

Yelén gave him a lopsided grin. "You know, Marta said some of the same things. You don't have her training, but you seem to have her sense. My gentle Machiavelli didn't shrink from the consequences, though. I've got to be popular, yet I've still got to have my way—"

She looked at him, seemed to reach a decision. "Look, Inspector, I want you to mix more. Both the NMs and the Peacers have regular recruiting parties. Go to the next Peacer one. Listen to what they're saying. Maybe you can explain them to me. And maybe you can explain *me* to *them*. You were a popular person in your time. Tell people what you think—even what you don't like about me. If they have to choose sides, I think I'm their best bet."

Wil nodded. First the Dasguptas and now Korolev: was there a conspiracy to get W.W. Brierson back in circulation? "What about the investigation?"

Yelén was silent for a moment. "I need you for both, Brierson. I mourned Marta for a hundred years. I traced her around the Inland Sea a meter at a time. I've got records or bobble samples of everything she did and everything she wrote. I—I think I'm over the rage. The most important thing in my life now is to see that Marta didn't die in vain. I will do *anything* to make the settlement succeed. That means finding the killer, but it also means selling my case to the low-techs."

9

That night he took another look at Marta's diary. It was a very low priority item now, but he couldn't concentrate on anything more technical. Yelén had read the diary several times. In their literal minded way, her autons had gone over the text in even more detail, and Lu's had cross-checked the analysis. Marta knew she had been murdered, but said again and again that she had no clues beyond her description of the evening of the party. According to the overdoc, she rarely repeated the details in later years, and when she did it was clear that her earlier memories were the more precise.

Now Wil browsed the earliest sections. Marta had stayed near Town Korolev for more than a year. Though she

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said otherwise, it was clear she hoped for rescue in some small multiple of ninety days. Even if that rescue didn't come, she had lots of preparing to do: she planned to walk to Canada, halfway around the world.

<<. . . but klick for klick it barely qualifies as an intermediate survival course,>> she wrote. <<It will take years, and I may miss a lookabout back here at Town Korolev, but that's okay. Along the way, I'll put billboards at the West End mines and the Peacer bobble. Once I get your attention, give me a sign, Lelya: nuke the sky for a week of nights. I'll find open ground, and wait for the autons.>>

Marta knew the territory near Korolev. Her shelter in the real time wing of the castle was secure, close to water and adequate hunting. It was a good place to collect her energy for the trek ahead. She experimented with the weapons and tools she'd known from survival sport. In the end she settled on a diamond bladed pike and knife, and a short bow. She kept the other diamond blades in reserve; she wasn't going to waste them on arrowheads. She built a travois from a section of Fred's hull. It was enough to do some testing. She made several cautious trips covering a few kilometers.

<<Dearest Lelya—If I am ever to leave, I suppose it should be now. The plan is still to sail to our mines at West End and then head north to the Peacer Bobble, and Canada far beyond that. Tomorrow I depart for the coast; tonight I finish packing. Would you believe, I have made so much equipment, I actually have *lists*. I'm half afraid it will be like the old days, when we'd get a few hours from home and remember all the things we had to go back for! Hope I see you before I write more. —Love, Marta>>

That was the last of the bark tablets she left at the castle. A thousand kilometers around the southern coast of the Sea, Yelén found the second of Marta's cairns, a three-meter-high pile of rock at the edge of the jacaranda forests. This was one of the best preserved of Marta's sites. She'd built a cabin there; it was still standing when Yelén studied it a century later.

Six months had passed since Marta left the castle in the mountains. She was still optimistic, though she had hoped to reach the mines before stopping. There had been problems, one of them painful and deadly. During her time at the cabin, Marta described her adventures since leaving the castle.

<<I followed our monorail to the coast. You know I said it was a waste to build that thing when we were going to leave it behind anyway. Well, now I'm glad you listened to Genet and not me. That right-of-way cuts straight through the forest. I avoided some tricky rock climbing just by sliding the travois along the rail's underframe. It was like a practice hike—which I needed more than I realized.

<<I've forgotten a lot, Lelya. I have just one poor brainful of memories now. If I'd known I was to be marooned, I would have loaded quite a different set. (But if I'd foreseen that, I probably could have avoided the whole adventure! Sigh. I should be glad I never offloaded our survival courses.) Anyway, my mind is full of our plans for the settlement, the stuff I was thinking

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about the night of the party. I have only a casual recollection of maps. I know we did lots of wildlife studies, and were hooked into Monica's work, too. But that's all gone. Where the plants are like the ones back in civilization, I recognize them.

<<For the rest, I have fragments of memory that are sometimes worse than useless: take the spiders and their jacaranda forests. These are *nothing* like the scattered trees and isolated webs up at Town Korolev. Here the trees are huge, and the forests go on forever. That much was obvious from the ground, walking along the monorail. We had slashed through that forest, but it towered on either side. The brush that had grown along the path was already covered by matted spider webbing. Ah, if I had remembered then what I've learned since, I'd probably be at the mines by now!

<<Instead, I wandered along beneath the rail (where for some reason the webs didn't come) and admired the gray silk that spread down from the jacarandas. I didn't dare cut through the webs to look into the forest; at that time, I was still scared of the spiders. They're little things, like the ones in the mountains, but if you look close you can see thousands of them moving in the webs. I was afraid they might be like army ants, ready to swarm down on whoever jiggled their silk. Eventually, I found a break in the shroud where I could step through without touching the threads. . . . Lelya, it's a different world in there, quieter and more peaceful than the deepest redwood grove. Dim green light is everywhere—the really thick webs are at the fringes of the forests. (And of course I didn't find the explanation for that till later.) There's no underbrush, no animals—only a musty smell and a greenish haze in the air. (I'll bet you're laughing at me now, because *you* already know what made that smell.) Anyway, I was impressed. It's like a cathedral . . . or a tomb.

<<I only spent an hour in there the first time; I was still nervous about the spiders. Besides, the point of this trip was to reach the Sea. I still planned to make a raft and sail direct to the West End. Failing that, short hops along the coast ought to bring me to the mines faster than any overland walk. So I thought.

<<It was storming the day I came in sight of the shore. I knew we had wrecked the coast with our tsunami, but I wasn't prepared for what I saw. The jungle was blasted flat for kilometers back from the Sea. The tree trunks were piled three and four deep, all pointing away from the water. I remember thinking that at least I would have plenty of lumber for my raft.

<<I sheltered the travois, and went a ways onto the coastal plain. The going was treacherous. Rotted vines swathed the trunks. Tree bark sloughed away under my weight. The topmost trunks were relatively clear, but slime slick. I crawled/walked from trunk to trunk. All the while, the storm was getting worse. The last time I'd been to the beach was to round up Wil Brierson—>>

A reader smiled. *She did remember my name!* Somewhere in the adventures of her next forty years she forgot, but for a while she had remembered.

<<—just before we raised the Peacers. It had been a warm, misty place.

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Today was different: lightning, thunder, wind-driven rain. No way was I going to get to water's edge this afternoon. I crawled along a tree trunk to its uptorn fan of roots, and peeked over. Fantasy land. There were three water spouts out there. They slid back and forth, the farther ones pale and translucent. The third had drifted inland, though it was still a couple klicks away. Dirt and timber splashed up from its tip. I crawled out of the wind, and listened to the roar. As long as it didn't get louder, I should be safe from heaven's dirty finger.

<<All this raised serious questions about my plan to take a shortcut across the Sea. No doubt this was an exceptional storm, but what about ordinary squalls? How common were they? The Inland Sea is a lot like the old Mediterranean. I remembered a guy named Odysseus who spent half his life being blown from one side of that pond to the other. I wished we had taken maritime sports more seriously. Sailing to Catalina barely qualified us as novices; we didn't even make our own boat. The notion of hugging the coast didn't look good either. I remembered the pictures: our tsunami had smashed the whole southern coast. There were no beaches or harbors left on this side of the Sea, just millions of tonnes of broken wood and mud. I would have to carry all my food even if I stayed close to the shore.

<<So there I was, kind of discouraged and awfully wet. My schedule was in a shambles. And that was a laugh. I have all the time in the world; that's the problem.

<<There was a super-close lightning bolt. From the corner of my eye I saw *something* rushing me. As I turned, it dropped on my shoulder, grabbing for my neck. An instant later something else landed on my middle, and on my leg. I bet I screamed as loud as ever in my life; it was lost in the thunder.

<<. . . They were *fishermonkeys*, Lelya. Three of them. They clung tight as leeches; one had its face buried in my middle. But they weren't biting. I sat rigid for a moment, ready to start smashing in all directions. The one on my leg had its eyes screwed shut. All three were shivering, and holding me so tight it hurt. I gradually relaxed, and set my hand on the fellow who had grabbed my middle. Through the seallike fur, I could feel its shivering ease a little.

<<They were like little children, running to Momma when the lightning got too bad. We sat in the lee of that root fan through the worst of the storm. They scarcely moved the whole time, their warm bodies stuck to my leg, belly, and shoulder.

<<The storm gentled to an even rain, and the temperature climbed back into the thirties. The three didn't rush off. They sat, looking at me solemnly. Now, even *I* don't believe that nature is full of cuddly creatures just waiting to love a human. I began to have some unhappy suspicions. I got up, climbed over the side of the trunk. The three followed, then ran a little way to one side, stopped and chittered at me. I walked to them, and they ran off again, and stopped again. Already I was thinking of them as Hewey, Dewey, and Lewey. (How did Disney spell those names?) Of course, fishermonkeys look nothing like ducks, either real or caricatured. But there was a cooperative

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madness about them that made the names inescapable.

<<Our lurching game of tag went on for fifty meters. Then we came to a pile that had recently slipped: I could see where the trunks had turned, exposing unweathered wood. The three didn't try to climb these. They led me around them . . . to where a larger monkey was pinned between two trunks. It wasn't hard to guess what had happened. A good-sized stream flowed beneath the pile. Probably the four had been fishing there. When the storm came up, they hid in the wooden cave formed by the tree trunks. No doubt the wind and the added water in the stream had upset the woodpile.

<<The three patted and pulled at their friend, but half-heartedly; the body wasn't warm. I could see that its chest was crushed. Perhaps this had been their mother. Or maybe it was the dominant male—Unca Donald even.

<<It made me sadder than it should, Lelya. I knew our rescuing the Peacers was going to blow a hole in the ecosystem; I'd already done my rationalizing, cried my tears. But . . . I wondered how many fishermonkeys were left on the south shore. I bet they were scattered in small groups all through the dead jungle. And now this. The four of us sat for a time, consoling each other, I hope.>>

<<If sea travel was out, my options were a bit constrained: The jungle parallels the coast and extends inland to the two thousand meter level. It would take me a hundred years to get around the Sea by hacking my way through that, with every stream at right angles to my line of travel. That left the jacaranda forests—back up where the air is cool, and the spiders spin their webs.

<<Oh. I took the fishermonkeys with me. In fact, they refused to be left behind. I was now mother, or dominant male, or whatever. These three had all the mobility of penguins. During the days, they spent most of the time on the travois. When I stopped to rest, they'd be off—racing each other around, trying to tease me into the chase. Then Dewey would come to sit by me. He was the odd man out. Literally. Hewey was a girl and Lewey the other male. (It took a while to figure this out. The fishers' sexual equipment is better hidden than in the monkeys of our time.) It was all very platonic, but sometimes Dewey needed another friend.

<<I can just see you, Lelya, shaking your head and muttering about sentimental weakness. But remember what I've said so many times: If we can survive and still be sentimental, life is a lot more fun. Besides, there were coldly calculated reasons for lugging my little friends back to the jac forest. The fishers are not entirely sea creatures. The fact that they can fish from streams shows that. These three ate berries and roots. Plants haven't changed as much as animals over these fifty megayears, but some of the changes can be inconvenient. For instance, Dewey *et al.* wouldn't touch the water I got from a traveler's palm; on the way down, that stuff had made me sick.>>

Here the diary had many pages of drawings, enhanced by Yelén's autons to show the dyes' original colors. These were not as skillfully drawn as those Wil had seen later in the diary—when she'd

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had years of practice—but they were better than anything he could do. Marta had brief notes by each picture: "Dewey wouldn't touch this when green, otherwise okay . . ." or "Looks like trillium; raises blisters like poison ivy."

Wil looked carefully at the first few pages, then skipped ahead to where Marta entered the jacaranda forest.

<<I was a bit frightened at first. The fishers picked up on it, edging moodily around on the travois and whimpering. Walking through the jac forest just seemed too *easy*. The air is wet and moist, yet not nearly so uncomfortable as in a rain forest. The mist I'd seen earlier is always present. The musky, choking smell is there, too, though you don't notice it after the first few minutes. The light coming through the canopy is shadowless and green. Floating down from the heights are occasional leaves and twigs. There are no animals; except at the edges of the forest, the spiders stick to the canopy. There are no trees but the jacs, and no vines. The ground cover is a moist carpet. In the top few centimeters you can see leaf fragments, perhaps little bits of spiders. Walking through it kicks up a murkier version of what hangs all through the air. A thousand meters into the forest, the only sounds you hear are those you make yourself. The place is beautiful, and heaven to hike through.

<<But you see why I was nervous, Lelya? Just a few hundred meters downslope was a *jungle*, a thickly grown, life-gone-to-crazy-excess jungle. There had to be something pretty fearsome keeping all competing plants and all animal pests out of the jac forest. I still had visions of spider armies sweeping down the trees and sucking the juice out of intruders.

<<I was very cautious the first few days. I walked close to the northern edge of the forest, close enough so I could hear the sounds of the jungle.

<<It didn't take long to see that the jungle/jac border is a war zone. As you walk toward the border, the forest floor is broken by the corpses of ordinary trees. The dead wood furthest in is scarcely recognizable lumps; closer to the border you can see whole trees, some still standing. What had been the leafy parts are drowned in ancient webs. Rank on rank of mushrooms cover the wood. Their colors are beautiful pastels . . . and the fishers wouldn't touch them.

<<Walk a bit farther and you're out from under the jacs. Here the jungle is alive and fighting to stay that way. Here the spider webs are thickest, a tight dark layer across the tree tops. Those webs are silver kudzu, Lelya. The critical battle in this war is the jungle top trying to grow past the shroud, and the spiders trying to lay still more silk on top. You know how fast things grow in a rain forest; the plants themselves play the shade-out game, growing a dozen centimeters in twenty-four hours. The spiders have to hustle to keep ahead. Since those first days, I've climbed into the jungle canopy just outside the jac forest and watched. On a busy day, the top of the kudzu web almost seems to froth, the little buggers are pumping out so much new silk.

<<Where the jungle trees are still living, you do see animals. Webs fan from tree to tree, black with trapped insects. For larger animals, the silk is

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no barrier. Snakes, lizards, catlike predators—I've seen them all in the thirty-meter-wide band that the spiders' kudzu shades. But they don't have dens there. They are fleeing, or chasing, or very sick. There are no monsters to scare them back; they just don't like to stay. By now I had some theories, but it was almost a week before I knew for sure.

<<Once or twice a day, we walked to the jungle's edge. There I did some easy hunting and we ate the berries the fishers liked. At night, we slept several hundred meters into the jacs, farther than any other animals dared come. And as long as I stayed far enough inside the forest, we made very good time. Even old jac trunks molder quickly away and the ubiquitous mulch smoothes out most ground irregularities. The only obstacles were the many streams that crossed our path. Down in the jungle, the brush along these streams would have been virtually impassable. Here, the mulch extended right to the water's edge. The water itself was clear, though where a stream broadened and the water slowed, there was greenish scum on the surface. There were fish.

<<Ordinarily, I don't mind drinking from a stream, even in the tropics. Any blood or gut parasites are just a tasty meal for my panphages. Here I was more careful. The first one we came to, I hung back and watched my committee of experts. They sniffed around, took a drink or two, and jumped in. A few seconds later they had their dinner. From then on, I didn't hesitate to ford the streams, floating the travois ahead of me.

<<But by the fifth day, Hewey was beginning to drag. She didn't come off the travois to play. Dewey and Lewey patted and groomed her, but she would not be jollied. By the next afternoon, they were equally droopy. There were sniffles and tiny coughs. It was about what I had expected. Now for the important question:

<<I found a camp site on the jungle side of the border. It was hell compared to the comfort we'd enjoyed in the jacs, but it was defensible and at the edge of a lake. By then the three were so weak I had to fish and forage for them.

<<I watched them for a week, trying to analyze the odds, trying to guess what once I could have remembered in an instant. It was the greenish mist, I was sure. Other stuff floated down endlessly from the top of the jacarandas. Other stuff came down too, but most of it was identifiable—leaves, bits of spider, things that might have been caterpillar parts. I had a fair estimate of the spider biomass; the jac tops were actually bowed down in places. The green mist . . . it was spider shit. That by itself was no big deal. The thing is, if you lived in the forest, you breathed a lot of it. Almost anything that fine would eventually cause health problems. It was clear now the spiders had gone a step further. There was something downright poisonous in that haze. Mycotoxins? The word pops to mind, but damn it, I have nowhere to remember more. It had to be more than an irritant. Apparently nothing had evolved a defense. Yet it wasn't super fast-acting. The fishers had lasted several days. The big question was how fast would it affect a larger animal (such as yours truly)? And could you recover just by leaving the forest?

<<I got the answer to the second

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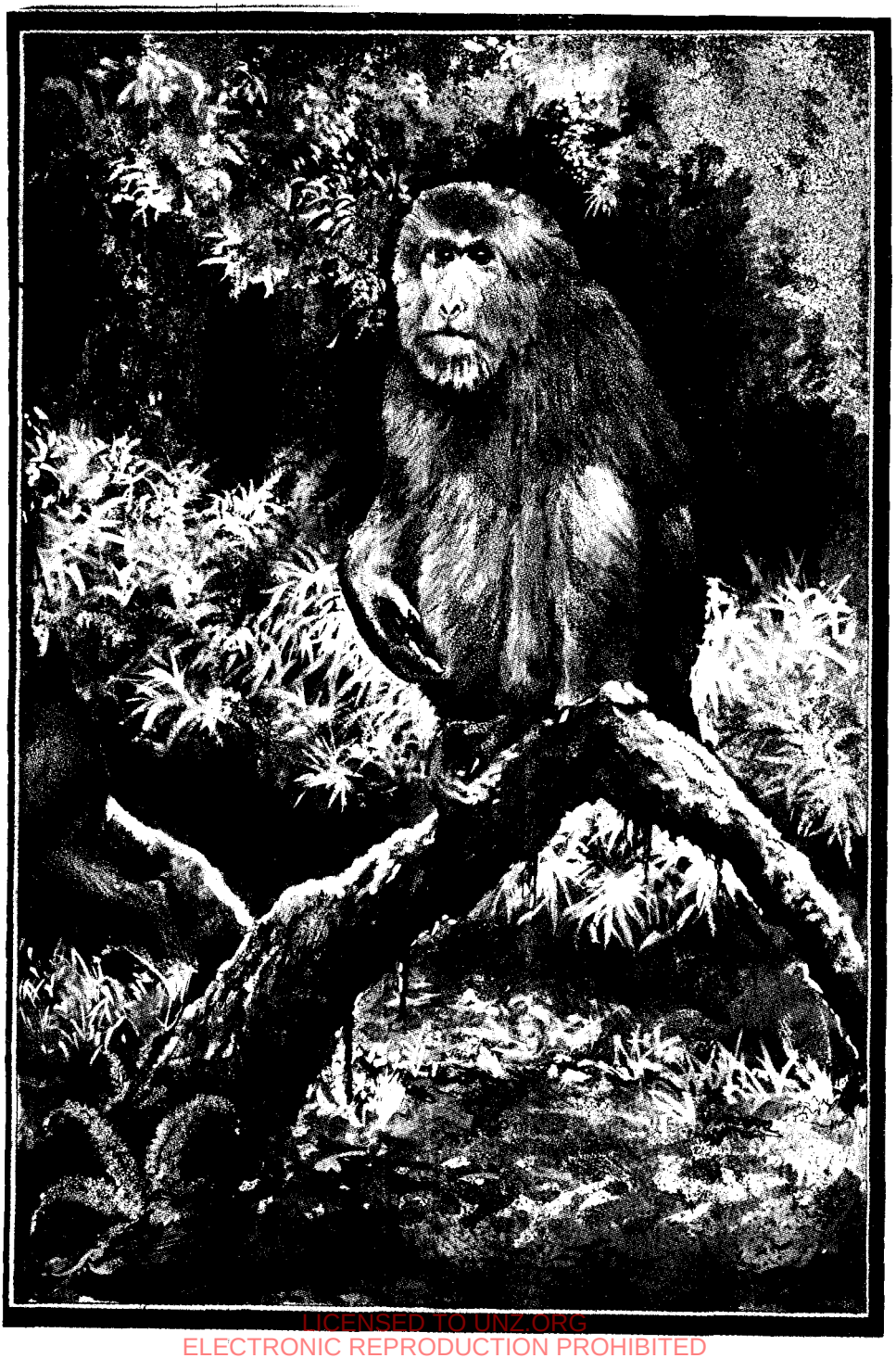

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question in a couple of days. All three came out their funk. Eventually they were fishing and rowdying as enthusiastically as ever. So I had the old decision to make, this time with a bit more information: Should I hike through the jac forest as far and fast as I was able? Or should I hack my way cross-wise through a thousand klicks of jungle? My guinea pigs looked as good as new; I decided to continue with the forest route, till I had symptoms.

<<It would mean leaving Dewey and Hewey and Lewey. I *hoped* I was leaving them better off than when I found them. That pond was alive with fish, as good as anything back in civilization. The fishermonkeys were quick to rush into the water at the first hint of land predators. The only threat from the water was something large and croc-like that didn't look very fast. It wasn't precisely like the jungle they had once known by the sea shore, but I would stay long enough to build them a sanctuary.

<<I ignored the fact that my survival craft was from a different era. For once, being sentimental was deadly:

<<The morning of the seventh day, it was obvious that something big had died nearby. The moist air always carried the scents of life and death, but a heavy overtone of putrefaction had been added. Hewey and Lewey ignored it, were busy chasing each other around the water's edge. Dewey was not in sight. Usually when the others squeezed him out he came to me; sometimes he just went off to sulk. I called to him. No answer. I'd seen him an hour earlier, so it couldn't be his demise the breeze announced.

<<I was just getting worried when Dewey raced out of the bushes, chittering gleefully. He held a huge black beetle between his hands.>>

A drawing covered the rest of the page. The creature looked like a stinkbug, but it was more than ten centimeters long according to the scale. Its enormous abdomen accounted for most of that size. The chitin was thick and black, laced by a network of deep grooves.

<<Dewey ran right up to Hewey, brushing Lewey aside. For once he had an offering that might give him precedence. And Hewey was impressed. She poked at the armored ball, jumped back in surprise when the bug gave a whistling *tweet*. In seconds they were rolling it back and forth between them, entranced by the tea-kettle noises and acrid bursts of steam that came from the thing.

<<I was as curious too. As I started toward them, Dewey grabbed the beetle to hold it up to me. Suddenly he screamed, and tossed the bug toward me. It struck the top of my right foot—and exploded.

<<I didn't know such pain could exist, Lelya. Even worse, I couldn't turn it *off*. I don't think I lost consciousness, but for a while the world beyond that pain scarcely existed. Finally I came back far enough to feel the wetness that flowed from the wound. The small bones in my foot were shattered. Chitin fragments had cut deep into my foot and lower leg. Dewey was bleeding too—but his wound was a nick compared to mine.

<<I've named them grenade beetles. I know now they're a carrion eater—with a defense worthy of a twenty-first cen-

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tury armadillo. When hassled, their metabolism becomes an acidulous pressure cooker. They don't want to die; they give plenty of warning. No creature from this region would deliberately give them any trouble. But if goaded to the bursting point, their death is an explosion that will kill any small attacker outright, and bring lingering death to most larger ones.

<<I don't remember much of the next few days, Lelya. I had to cause myself even greater pain trying to set the bones of my foot. It hurt almost as much to pick out the fragments of chitin. They smelled of rot, of the corpse that beetle had been into. God only knows what infections my panphages saved me from.

<<The fishermonkeys tried to help. They brought berries and fish. I improved. I could crawl, even walk with a makeshift crutch—though it hurt like hell.

<<Other creatures knew I was hurt. Various things nosed about my shelter, but were chased off by the fishers. I woke one morning to loud fishermonkey screeching. Something big shuffled by, and the monkey's cry ended in a horrible squeak.

<<That afternoon, Hewey and Lewey were back, but I never saw Dewey again.

<<A jungle does not tolerate convalescents. Unless I could get back to the jac forest, I would be dead very soon. And if the remaining fishers were half as loyal as Dewey, they would be dead, too. That evening, I put the berries and freshest fish onto my travois. Meter by meter, I dragged it back to the jac forest. Hewey and Lewey followed me part way in. Even their foolish penguin walk was enough to keep up. But they feared the forest now, or maybe they weren't as crazy as Dewey, for eventually they fell behind. I still remember their calling after me.>>

This was Marta's closest brush with death for many years. If there had not been good fishing in the first stream she found or if the jac forest had been any less gentle than she imagined, she would not have survived.

The weeks passed, and then a month. Her shattered foot slowly healed. She spent nearly a year by that stream just inside the forest, returning to the jungle only occasionally—for fresh fruit, and to check on the fishers, and to hear some sounds beyond herself. It became her second major camp, the one with the cabin and the cairn. She had plenty of time to bring her diary up to date, and to scout the forest. It was not everywhere the same. There were patches of older, dying jacarandas. The spiders hung their display webs across those trees, turning the light blue and red. Most of her descriptions of the forest gave Wil the feeling of unending catacombs, but this was a cathedral, the webs stained glass. Marta couldn't remember the purpose of the display webs. She stayed for days under one of them, trying to fathom the mystery. Something sexual, she guessed: but for the spiders . . . or the trees? For a weird instant, Wil felt impelled to look up the answer for her; she of all people deserved to know. Then he shook his head, and deliberately paged his data set.

Marta figured out most of the spiders' life cycle. She'd seen the enormous

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quantities of insect life trapped on the perimeter barriers, and she guessed at the tonnage that must be captured on the canopy. She also noticed how often the fallen leaves were fragmented, and correctly guessed that the spiders maintained caterpillar farms much as ants keep aphids. She did as much as any naturalist without tools could.

<<But the forest never made me sick, Lelya. A mystery. In fifty million years, has Evolution's arms race drifted so far that I'm outside the range of the spider shit toxin? I can't believe that, since the poison seems to work on everything that moves. More likely, there's something in my medical systems, the panphages or whatever, that's protecting me.>>

Wil looked up from the transcript. There was more of course, almost two million words more.

He stood up, walked to the window, and turned off the lights. Down the street, the Dasguptas' place was still and dark. It was a clear night; the stars were almost a dust across the sky, outlining the tree tops. This day seemed awfully long. Maybe it was the trip to Califia and going through two sunsets in one day. More likely it was the diary. He knew he was going to keep reading it. He knew he was going to give it more time than the investigation justified. Damn.

10

For Wil Brierson, dreams had always waited at the end of sleep. In earlier times, they had waited to entertain and enlighten. Now, they lay in ambush.

Goodbye, goodbye, goodbye. Wil cried and cried, but no sounds came and scarcely any tears. He was holding hands with someone, someone who didn't speak. Everything was shades of pale blue. Her face was Virginia's, and also Marta's. She smiled sadly, a smile that could not deny the truth they both knew . . . *Goodbye, goodbye, goodbye.* His lungs were empty, yet still he cried, forcing out the last of his breath. He could see through her now, to blue beyond. She was gone, and what he might have saved was lost forever.

Wil woke with an abrupt gasp for breath. He had exhaled so far it hurt. He looked up at the gray ceiling and remembered an advertisement from his childhood. They'd been pushing medical monitors; something about 6:00 A.M. being a good time to die, that lots of people suffered sleep apnea and heart attacks just before waking—and wouldn't everyone be safer if everyone bought automatic monitors.

It couldn't happen with modern medical treatment. Besides, the autons Yelén and Della had floating above the house were monitoring him. And a second besides—Wil smiled sourly to himself—the clock said 10:00 A.M. He had slept nearly nine hours. He swung his bulk out of bed, feeling like he had slept less than half that.

He lumbered into the bathroom, washed away the strange wetness he found around his eyes. All through his career, he'd done his best to project an appearance of calm strength. It hadn't been hard: he was built like a tank, and he was naturally a low-blood-pressure type. There were a few cases that had made him nervous, but that had been reasonable, since bullets were flying.

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In police work, he'd seen a fair number of people crack up. For all the publicity given cases like the Kansas Incursion, most of the violence in his era was simple domestic stuff, folks driven around the bend by job or family pressures.

He smiled wryly at the face in the mirror. He had never imagined it could happen to him. The end of sleep was a walk down night paths now. He had a feeling things were going to get worse. Yet there was a part of him that was as analytical as always, that was following his morning dreams and daytime tension with surprised interest, taking notes at his own dismemberment.

Downstairs, Wil threw open the windows, let the morning sounds and smells drift in. He was damned if he'd let this funk paralyze him. Later in the day, Lu was coming over. They would talk about the weapons survey, and decide whom to interview next. In the meantime, there was lots of work to do. Yelén was right about studying the high-techs' lives since the Extinction. In particular, he wanted to learn about Sánchez's aborted settlement.

He was barely started on this project when Juan Chanson dropped by. In person. "Wil, my boy! I was hoping we might have a chat."

Brierson let him in, wondering why the high-tech hadn't called ahead. Chanson strode quickly around the living room. As usual, he was energetic to the point of twitchiness. "'*Blas Español*, Wil?" he said.

"*Sí,*" Brierson replied without thinking; he could get by, anyway.

"*Buen.*" The archeologist continued in Spañolnegro. "I really get tired of English, you know. Never can get just the right word. I'll wager some people think me a fool because of it."

Wil nodded at the rush of words. In Spañolnegro, Chanson talked even faster than in English. It was an impressive — and nearly unintelligible —achievement.

Chanson stopped his nervous tour of the living room. He jerked a thumb at the ceiling. "I suppose our high-tech friends are taking in every word?"

"Uh, no. They're monitoring body function, but I would have to call for help before our words would be interpreted." *And I asked Lu to make sure Yelén did no eavesdropping.*

Chanson smiled knowingly. "So they tell you, no doubt." He placed a gray oblong on the table; a red light blinked at one end. "Now the promises are true. Whatever we say goes unrecorded." He waved for Brierson to be seated.

"We've talked about the Extinction, have we not?"

"*Sí.*" Several times.

Chanson waved his hand. "Of course. I talk to everybody about it. Yet how many believe? Fifty million years ago, the human race was *murdered,* Wil. Isn't that important to you?"

Brierson sat back. This would shoot the morning. "Juan, the Extinction is very important to me." Was it really? Wil had been shanghaied more than a century before it. To his heart, that was when Virginia and Anne and W.W. Jr. had died—even if the biographies said they lived into the twenty-third century. He had been shanghaied across 100,000 years; that was many times longer than all recorded history. Now he lived at fifty megayears. Even without the capital-e Extinction, this was so deep in the

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future that no one could expect the human race still to exist. "But most high-techs don't think there was an alien invasion. Alice Robinson said the race died out over the whole twenty-third century, and that there weren't signs of violence until very late. Besides, if there were an invasion, you'd think we'd have all sorts of refugees from the twenty-third. Instead we have *nobody*—just the last of you high-techs from 2201 and 2202."

Chanson sniffed. "The Robinsons are fools. They fit the facts to their rosy preconceptions. I've spent thousands of years of my life piecing this together, Wil. I've mapped every square centimeter of Earth and Luna with every diagnostic known to man. Bil Sánchez did the same for the rest of the Solar System. I've interviewed the rescued low-techs. Most of the high-techs think I'm a crank, I've so thoroughly abused their hospitality. There's a lot I don't understand about the aliens—but there's a lot that I do. There are no refugees from the twenty-third because the invaders could jam bobble generators; they had some super-powerful version of the Wáchendon suppressor. The extermination was not like twentieth century nuclear war, over in a matter of weeks. I've dated the Norcross graffiti at 2230. Apparently, the aliens were using specifically anti-human weapons early in the war. On the other hand, the vanadium tape Billy Sánchez found on Charon appears to be from late in the century. It ties in with the new craters there and in the asteroids. At the end, the aliens dug out the deep resistance with nukes."

"I don't know, Juan. It's so far in the past now—how can we prove or disprove anyone's theories? What's important is to make sure our settlement succeeds and humanity has another chance."

Chanson leaned across the table, even more intense than before. "Exactly. But don't you see? The aliens had bobblers, too. What destroyed civilization threatens to destroy us now."

"After fifty million years? What could be the motive?"

"I don't know. There are limits to physical investigation, no matter how patient. But I think it was a close thing back in the twenty-third. They pulled out all the stops at the end, and it was barely enough. After the war, they were very weak—perhaps on the edge of extinction themselves. They were gone from the Solar System for millions of years. But make no mistake, Wil. They have not forgotten us."

"You expect another invasion."

"That's what I've always feared, but I'm beginning to feel otherwise. There are too few of them; their game is stealth now. They aim to divide and destroy. Marta's murder was only the beginning."

"*What?*"

Chanson flashed a quick, angry smile. "The game is not so academic now, is it, my boy? With that murder, they crippled us. Marta was the brains behind the Korolev plan."

"You claim they're here *among* us? I should think you high-techs can monitor things coming into the System."

"Certainly, though the others don't bother. One of the safest places for long-term storage is on cometary orbits. Such bobbles return every hundred thousand

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years or so. Only *I* seem to realize that a few more return than go out. At least half my time has been spent building a surveillance net. Over the megayears I intercepted three coming in with substantial hyperbolic excess. Two came out of stasis in the inner Solar System, surrounded by my forces. *They came out shooting*, Wil."

"Did they use the super Wáchendon suppressor?"

"No. I think they're surviving equipment is scarcely better than ours. With my superior position, I managed to destroy both of them."

Wil looked at the little man with new respect. Like all the high-techs, he was a monomaniac; anyone who pursued one objective for centuries would be. His conclusions had been ridiculed by most of the others, yet he stuck by them and had done his best to protect the others from a threat only he could see. If Chanson was right. . . . Wil's mouth was suddenly dry. He could see where this was leading. "What about the third one, Juan?" he said quietly.

Again that angry smile. "That one was much more recent, *much* more clever. It did a lookabout before I was in position. I was outmaneuvered. By the time I got back to Earth, it was already here, claiming to be human — claiming to be Della Lu, long-lost spacer. Your partner is a monster, my boy."

Wil tried not to think about the firepower that floated over their heads. "Is there any solid evidence? Della Lu was a real person."

Chanson laughed. "They're weak now. Subterfuge may be all that's left them—and surely they have copies of GreenInc. Did you see this 'Della Lu' right after she arrived? It would be a joke to call that thing human. The claim she's so old that normal human attributes have faded is nonsense. *I'm* more than two thousand years old, and *my* behavior is perfectly normal."

"But she was alone all that time." Wil's words defended her, but he was remembering the encounter on the beach, Lu's insectile manner, her cold stare. "Surely a medical exam would settle this."

"Maybe. Maybe not. I have reason to think the exterminators are of nearly human structure. If their life-sciences are as good as ours, they could rearrange their innards to human standards. As for subtle chemical tests—our ignorance of them and their technology is simply too great to risk accepting negative evidence as proof."

"Whom else have you told?"

"Yelén. Philippe. You can be sure I'm making no public accusations. The Lu creature knows *someone* attacked her coming in, but I don't think she knows who. She may even think it was an automatic action. Even if she's alone, she is terribly dangerous, Wil. We can't afford to move against her until all the high-techs are willing to act together. I pray this will happen before she destroys the settlement.

"I don't know if Philippe believes me, but I think he'd act if the rest could be won over. As for Yelén, well . . . I already said she was the lesser of the Korolevs. She's done some passive testing, and can't believe the enemy could make such a good counterfeit. She's totally unimpressed by Lu's erratic be-

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havior. Basically, Yelén has no imagination.

"You may be the key, Wil. You see Lu every day. Sooner or later she is going to slip, and you will *know* that what I say is true. It is vitally important you prepare yourself for that moment. With luck, it will be something small, something you can pretend to ignore. If you can cover your knowledge, she may let you live.

"And if she lets you live, then maybe we can convince Yelén."

And if she doesn't let me live, no doubt that will be evidence too. One way or another, Chanson had a use for him.

11

Della Lu arrived in early afternoon. Wil stepped outside to watch her land. The autons supplied by Yelén and Della were faithfully keeping station several hundred meters above the house. He wondered what a battle between those two machines would be like, and whether he could survive it. Before, he'd been grateful for Lu's protection against Yelén. Now it worked both ways. Brierson kept his face placid as the spacer walked toward him.

"Hi, Wil." Even with his recollection of the early Della, it was hard now to believe that Chanson could be right. Lu wore a pink blouse and belled pants. Her hair was cut in bangs that swayed girlishly as she walked. Her smile seemed natural and spontaneous.

"Hi, Della." He grinned back with a smile he hoped seemed just as natural and spontaneous. She entered the house ahead of him.

"Yelén and I have a disagreement we'd like you to—" She stopped talking and her body tensed. She sidled around the living room table, her eyes flicking across its surface. Abruptly something round and silver gleamed there. She picked it up. "Did you know you were bugged?"

"No!" Wil walked to the table. A spherical notch about a centimeter across had been cut from it. The notch was where Chanson had set his bug stomper.

She held up the silver sphere—an exact match for the notch—and said, "Sorry to nick your table. I wanted to bobble it first thing. Some bugs bite when they are discovered."

Wil looked at his face reflected perfect and tiny in the ball. It could contain anything. "How did you spot it?"

She shrugged. "It was too small for my auton to see. I've got some built-in enhancements." She tapped her head. "I'm a little more capable than an ordinary human. I can see into the UV and IR, for instance . . . Most of the high-techs don't bother with such improvements, but it can be useful sometimes."

Hmm. Wil had lived several years with medical electronics jammed inside his skull; he hadn't liked it one bit.

Della walked across the room and sat on the arm of one of his easy chairs. She swung her feet onto the seat and braced her chin on her hands. The childlike mannerisms were a strange contrast to her words. "My auton says Juan Chanson was your last visitor. Did he get near the table?"

"Yes. That's where we were sitting."

"Hmm. It was a dumb trick, ran a

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high risk of detection. What did he want anyway?''

Wil was ready for the question. His response was prompt but casual. ''He rambled, as usual. He's discovered I speak Spañolnegro. I'm afraid I'll be his favorite audience from now on.''

''I think there's more to it than that. I haven't been able to get an appointment for us to interview him. He won't say 'no,' but he has endless excuses. Philippe Genet is the only other person who seems to be avoiding us. We should put these people at the top of our interview list.''

She was doing a better job of proving Juan's case than Juan himself. ''Let me think about it . . . What was it you and Yelén wanted to know?''

''Oh, that. Yelén wants to keep Tammy bobbled for a century or so, till the low-techs are 'firmly rooted.' ''

''And you don't.''

''No. I have several reasons. I promised the Robinsons Tammy would be safe. That's why I refuse to turn her over to Yelén. But I also promised them that Tammy would be given a chance to clear the family name. She claims that means she should be free to operate in the present.''

''I'll bet Don Robinson couldn't care less about his good name. Things are too hot for the family, but he still wants recruits. If Tammy is bobbled she won't be doing any recruiting.''

''Yes. Those are almost Yelén's words.'' Della moved off the chair arm, and sat like an adult. She steepled her hands and stared at them a moment. ''When I was very young—even younger than you—I was a Peacer cop. I don't know if you understand what that means. The Peace Authority was a government, no matter what its claims. As a government cop, my morality was very different from yours. The long range goals of the Authority were the basis of that morality. My own interests and the interests of others were secondary—though I truly believed that survival depended on achieving the Authority's goals. The history books talk mostly about how I stopped Project Renaissance and brought down the Peacers, but I also did some . . . pretty rough things for the Authority; look up my management of the Mongolian Campaign.

''That youngest version of Della Lu would have no problem here: Leaving Tammy free is a risk—a very small risk—to the goal of a successful colony. That Della Lu would not hesitate to bobble her, perhaps even execute her, to avoid that risk.

''But I grew out of that.'' Her steepled hands collapsed, and her expression softened. ''For a hundred years I lived in a civilization where individuals set their own goals and guarded their own welfare. That Della Lu sees what Tammy is going through. That Della Lu believes in keeping promises made.''

Wil forced himself to think on the question. ''I believe in abiding by contracts, too, though I'm not quite sure what was agreed to here. I'm inclined to release Tammy. Let her proselytize, but without her headband. I doubt she remembers enough technology to make any difference.''

''It's possible the Robinsons left an equipment cache someplace where Tammy and her recruits could get it.''

''If they did, that would be pretty good evidence they knew about the

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murder beforehand. Why don't we release her, but bug her mercilessly. If she does more than talk, we'll bobble her. Tammy and her family are the best suspects. If we keep her locked up, it's possible we'll never solve the murder. . . . Do you think Yelén would go for that?"

"Yes. That's more or less the argument I made. She said okay if you agreed."

Wil's eyebrows rose. He was both surprised and flattered. "That's settled, then." He looked through the window, trying to think how the conversation might be turned to the topic that was really bothering him. "You know, Della, I had a family. From what I read in GreenInc, they lived right through to the Extinction. I hate to think that Monica is right—that humankind just committed suicide. And Juan's theories are just as obnoxious: How do you think it ended?" He hoped the camouflage hid his real interest. And it wasn't entirely camouflage: he'd be grateful to get a nonviolent explanation for the end of civilization.

Della smiled at the question. She seemed without suspicion. "It's always easier to seem wise if you're selling pessimism. That makes Juan and Monica seem smarter than they really are. The truth is . . . there was no Extinction."

"What?"

"*Something* happened, but we have only circumstantial evidence what it was."

"Yes, but that 'something' killed every human outside of stasis." He could not disguise his sarcasm.

She shrugged. "I don't think so. Let me give you my interpretation of the circumstantial evidence:

"During the last two thousand years of civilization, almost every measure of progress showed exponential growth. From the nineteenth century on, this was obvious. People began extrapolating the trends. The results were absurd: vehicles traveling faster than sound by the mid-twentieth century, men on the Moon a bit later. All this was achieved, yet progress continued. Simple-minded extrapolations of energy production and computer power and vehicle speeds gave meaninglessly large answers for the late twenty-first century. The more sophisticated forecasters pointed out that real growth eventually saturates; the numbers coming out of the extrapolations were just too big to be believed."

"Hmpf. Sounds to me like they were right. I really don't think 2100 was more different from 2000 than 2000 was from 1900. We had prolongevity and economical space travel, but those were in the range of conservative twentieth century prediction."

"Yes, but don't forget the 1997 war. It just about eliminated the human race. It took more than fifty years to dig out of that. After 2100 we were back on the exponential track. By 2200, all but the blind could see that something fantastic lay in our immediate future: We had practical immortality. We had the beginnings of interstellar travel. We had networks that effectively increased human intelligence—with bigger increases coming."

She stopped, seemed to change the subject. "Wil, have you ever wondered what became of your namesake?"

"The original W.W.? . . . Say," he

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said, with sudden realization, "you actually *knew* him, didn't you?"

She smiled briefly. "I *met* Wili Wáchendon a couple of times. He was a sickly teenager, and we were on the opposite sides of a war. But what became of him after the fall of the Peacers?"

"Well, he invented too many things for me to remember. He spent most of his time in space. By the 2090s, you didn't hear much about him."

"Right. And if you follow him in GreenInc, you'll see the trend continued. Wili was a first-rate genius. Even then he could use an interface band better than I can now. I figure that, as time passed, he had less and less in common with ordinary humans. Wili's mind and computers were already in the twenty-third century."

"And you think that's what happened to all mankind eventually?"

She nodded. "By 2200, we could increase human intelligence itself. And intelligence is the basis of all progress. My guess is that by midcentury, any goal—any goal you can state objectively, without internal contradictions—could be achieved. And what would things be like fifty years after *that?* There would still be goals, there would still be striving; but it would be beyond our imagination.

"To call that time 'the Extinction' is absurd. It was a Singularity, a place where normal human extrapolations broke down, a place where new models for human experience were devised. And those new models are beyond our intelligence."

Della's face was aglow. It was hard for Wil to believe that this was the fabrication of an exterminator of the human race. In the beginning at least, these had been human ideas and human dreams.

"It's a funny thing, Wil. I left civilization in 2202. Miguel had died just a few years earlier. That meant more to me than any Big Picture. I wanted to be alone for a while, and the Gatewood's Star mission seemed ideal. I spent forty years there, and was bobbled out for almost twelve hundred. I fully expected that when I got back, civilization would be unintelligible." Her smile twisted. "I was very surprised to find Earth empty. But then, what could be less intelligible than a total absence of intelligence? From the nineteenth century on, futurists wondered about the destiny of science. And now, from the other side of the Singularity, the mystery is just as deep.

"There was no Extinction, Wil. Mankind simply graduated, and you and I and the rest missed graduation night."

"So three billion people just stepped into another plane. This begins to sound like religion, Della."

She shrugged. "Just talking about superhuman intelligence gets us into something like religion." She grinned. "If you really want the religious version . . . have you met Jason Mudge? He claims that the Second Coming of Christ was sometime in the twenty-third century. The Faithful were saved, the unFaithful destroyed—and the rest of us are truant."

Wil smiled back. He had seen Mudge. His notion of the Second Coming could explain things too—in one respect better than Lu's theory: "I like your ideas better. But what's your explanation for the physical destruction? Chanson isn't the

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only person who thinks that nukes and bioweapons were used toward the end of the twenty-third."

Della hesitated. "That's the one thing that doesn't fit. When I returned to Earth in 3400, there was plenty of evidence of war. The craters were already overgrown, but from orbit it was obvious that metropolitan areas had been hit. Chanson and the Korolevs have better records; they were active all through the fourth millennium, trying to figure out what had happened, and trying to rescue short-term low-techs. It looks like a classic nuclear war, fought without bobbles. The evidence of biowarfare is much more tenuous.

"I don't know, Wil. There must be an explanation. The trends in the twenty-second century were *so* strong that I can't believe the race committed suicide. Maybe it was a fireworks celebration. Or maybe . . . do you know about survival sport?"

"That was after my time. I read about it in GreenInc."

"Physical fitness has always been a big thing in civilization. By the late twenty-second, medical care automatically maintained body fitness, so people worked on other things. Most middle-class folk had earthside estates of several thousand hectares. There were shared estates bigger than some twentieth century nations. Fitness came to mean the ability to survive without technology. The players were dropped naked into a wilderness—arctic, rainforest, you name it—that had been secretly picked by the judges. No technology was allowed, though medical autons kept close track of the contestants; it could get to be pretty rough. Even people who didn't compete would often spend several weeks a year living under conditions that would be deadly to twentieth century city-dwellers. By 2200, individuals were probably tougher than ever before. All they lacked was the bloody-mindedness of earlier times."

Wil nodded. Marta had certainly demonstrated what Lu was saying. "How does this explain the nuke war?"

"It's a little farfetched, but . . . imagine things just before the race fell into the Singularity. Individuals might be only 'slightly' superhuman, and might still be interested in the primitive. For them, nuclear war might be a game of strength and fitness."

"You're right; that does sound farfetched."

She shrugged.

"Would you say Juan is in the minority, thinking mankind was exterminated?"

"I think so; I know Yelén agrees with me. But remember that—until very recently—I didn't have much chance to talk to anyone. I was back in the Solar System for a few years around 3400. During that time, no one was out of stasis. They'd left plenty of messages, though: The Korolevs were already talking about a rendezvous at fifty megayears. Juan Chanson had an auton at L4 blatting his theories to all who would listen. It was clear to me that with the evidence at hand, they could argue forever without proving things one way or the other.

"I wanted certainty. And I thought I could have it." She made that twisted smile again.

"So *that's* why you went back into space."

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"Yes. What had happened to us must have happened—must *be happening*—over and over again throughout the universe. From the twentieth century on, astronomers watched for evidence of intelligence beyond the Solar System. They never saw any. We wonder about the great silence on Earth after 2300. They wondered about the silence among the stars. Their mystery is just the space-like version of ours.

"There is a difference. In space, I can travel any direction I wish. I was sure that eventually I would find a race at the edge of the Singularity."

Listening to her, Wil felt a strange mix of fear and frustration. One way or another, this person must *know* what others could only speculate. Yet what she told him and the truth could be entirely different things. And the questions that might distinguish lie from truth might provoke a deadly response. "I've tried to use your databases, Della. They're very hard to understand."

"That's not surprising. Over the years, there was some nonrepairable damage; parts of my GreenInc are so messed up I don't even use them. And my personal dbs . . . well, I've customized them quite a bit."

"Surely you want people to know what you've seen?" Yet Della had always been strangely close-mouthed about her time Out There.

She hesitated. "Once I did. Now I'm not sure. There are people who don't want to know the truth. . . . Wil, someone fired on me when I entered the Solar System."

"What?" Brierson hoped his surprise sounded real. "Who was it?"

"I don't know. I was a thousand AUs out, and the guns were automatic. My guess is Juan Chanson. He seems to be the most paranoid about outsiders, and I was clearly hyperbolic."

Wil suddenly wondered about the "aliens" Juan said he had destroyed. How many of them had been returning spacers? Some of Juan's theories could be self-proving. "You were lucky," he said, probing gently, "to get past an ambush."

"Not lucky. I've been shot at before. Anytime I'm less than a quarter light-year from a star, I'm ready to fight—usually ready to run, too."

"So there *are* other civilizations!"

For a long moment, Della didn't answer. Her personality shifted yet again. Expression drained from her face, and she seemed almost as cold as in their first meetings.

"Intelligent life is a rare development.

"I spent nine thousand years on this, spread across fifty million years of real time. I averaged less than a twentieth light speed. But that was fast enough. I had time to visit the Large Magellanic Cloud and the Fornax System, besides our own galaxy. I had time to stop at tens of thousands of places, at astrophysical freaks and normal stars. I saw some strange things, mostly near deep gravity wells. Maybe it was engineering, but I couldn't prove it, even to myself.

"I found that most slow-spinning stars have planets. About ten percent of these have an earth-type planet. And almost all such planets have life.

"If Monica Raines loves the purity of life without intelligence, she loves one of the most common things in the

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universe. . . . In all my nine thousand years, I found two intelligent races." Her eyes stared into Wil's. "Both times I was too late. The first was in Fornax. I missed them by several billion years; even their asteroid settlements were ground to dust. There were no bobbles, and it was impossible to tell if their ending had been abrupt.

"The other was a nearer thing, both in space and time: a G2 star about a third of the way around the galaxy from here. The world was beautiful, larger than Earth, its atmosphere so dense that many plants were airborne. The race was centaur-like; I learned that much. I missed them by a couple of hundred megayears. Their databases had evaporated, but their space settlements were almost undamaged.

"They had vanished just as abruptly as humankind did from Earth. One century they were there, the next—nothing. But there were differences. For one thing, there was no sign of nuclear war. For another, the centaur-folk had started a couple of interstellar colonies. I visited them. I found evidence of growing population, of independent technological progress, and then . . . their own singularities. I lived two thousand years in those systems, spaced out over a half-megayear. I studied them as carefully as Chanson and Sánchez did our solar system.

"There were bobbles in the centaur systems. Not as many as near Earth, but this was a lot longer after their singularity. I knew if I hung around, I'd run into somebody."

"Did you?"

Della nodded. "But what sort of person would you expect 200 megayears after civilization? . . . The centaur came out shooting. I nuked out fast. I ran fifty light-years, past where the centaur had any interest. Then, over the next million years, I sneaked back. Sure enough, he was back in stasis, depending on occasional lookabouts and his autons for protection. I left plenty of robot transmitters, some with autons. If he gave them half a chance, they would teach him my language and convince him I was peaceful. . . .

"His real time forces attacked the minute they heard my transmissions. I lost half my auton defense holding them off. I almost lost my life; that's where my dbs were damaged. A thousand years later, the centaur himself came out of stasis. Then *all* his forces attacked. Our machines fought another thousand years. The centaur stayed out of stasis the whole time. I learned a lot. He was willing to talk even if he had forgotten how to listen.

"He was alone, had been the last twenty thousand years of his life. Once upon a time, he'd been no nuttier than most of us, but those twenty thousand years had burned the soul from him." She was silent for a moment—thinking on what nine thousand years could do? "He was caught on behavior tracks he could never—could never want to —break. He thought of his solar system as a mausoleum, to be protected from desecration. One by one, he had destroyed the last centaurs as they came out of stasis. He had fought at least four travelers from outside his system. God knows who they were—centaur spacers, or 'Della Lus' of other races.

"But like us, he couldn't replace his autons. He had lost most of them when

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I found him; I wouldn't have stood a chance a hundred megayears earlier. I suppose, if I had stayed long enough I could have beaten him. The price would have been my living more thousands of years; the price would have been *my* soul. In the end, I decided to let him be." She was silent for a long while, the coldness slowly departing from her face, to be replaced by . . . tears? Were they for the last centaur—or for the millennia she had spent, never finding more than the mystery she began with?

"Nine thousand years . . . was not enough. Artifacts from beyond the Singularity are so vast that doubters can easily deny them. And the pattern of progress followed by vanishment can be twisted to any explanation—especially on Earth, where there are signs of war."

There was a difference between Della's propaganda and the others', Wil realized. She was the only one who seemed plagued by uncertainty, by any continuing need for proof. It was hard to believe that such an ambiguous, doubt-ridden story could be an alien cover. Hell, she seemed more human than Chanson.

Della smiled, but did not not brush the wetness from her lashes. "In the end, there is only one way to know for a fact what the Singularity is. You have to be there when it happens. . . . The Korolevs have brought together everybody that's left. We have all the truants. I think we have enough people. It may take a couple of centuries, but if we can restart civilization *we will make our own singularity*.

"And *this* time, I won't miss graduation night."

* * *

12

Wil was at the North Shore party later that week.

Virtually everyone was there, even some high-techs. Della and Yelén were absent—and Tammy was more or less forbidden from these outings—but he saw Blumenthal and Genet. Today they looked almost like anyone else. Their autons hovered high, all but lost in the afternoon light. For the first time since taking the Korolev case, Wil didn't feel like an outsider. His own autons were indistinguishable from the others, and even when visible, the fliers seemed no more intimidating than party balloons.

There were two of these affairs each week, one at Town Korolev sponsored by New Mexico, the other run by the Peacers here at North Shore. Just like Rohan said, both groups were doing their best to glad-hand the uncommitted. Wil wondered if ever in history governments had been forced to tread so softly.

Clusters of people sat on blankets all across the lawn. Other folks were lining up at the barbecue pits. Most were dressed in shorts or shorts and tops. There was no sure way of telling Peacers from NMs from ungovs, though most of the blue blankets belonged to the Republic. Steve Fraley himself was attending. His staff seemed a little stiff, sitting on lawn chairs, but they were not in uniform. The top Peacer, Kim Tioulang, walked over and shook Steve's hand. From this distance, their conversation looked entirely cordial. . . .

So Yelén figured he should mingle, observe, find out just how unpopular her plans were. Okay. Wil smiled faintly, and leaned back on his elbows. It had been a matter of duty to come to this

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picnic, to do just what the Dasgupta brothers —and simple common sense— had already suggested. Now he was very glad he was here, and the feeling had nothing to do with duty.

In some ways, the North Shore scenery was the most spectacular he'd seen. It was strikingly different from the south side of the Inland Sea. Here, forty-meter cliffs fell straight to narrow beaches. The lawns that spread inland from the top of the cliffs were as friendly as any park in civilization. A few hundred meters farther north, the clifftop bench ended in steep hills shrouded by trees and flowers—climbing and climbing, till they stood faintly bluish against the sky. Three waterfalls streamed down from those heights. It was like something out of a fairy tale.

But the view was only the smallest part of Wil's pleasure. He'd seen so much beautiful country the last few weeks—all untouched and pristine as any city-hater could wish. Something in the back of his mind thought it the beauty of a tomb—and he a ghost come to cry for the dead. He brought his gaze back from the heights, and looked across the crowds of picnickers. *Crowds,* by God! His smile returned, unthinking. Two hundred, three hundred people, all in one spot. Here he could see that they really did have a chance, that there could be children and a human future, and a use for beauty.

"Hey, Lazybones, if you're not going to help with the food, at least give us room to sit down!" It was Rohan, a big grin on his face. He and Dilip were back from the food lines. Two women accompanied them. The four sat down, laughing briefly at Wil's embarrassment. Rohan's friend was a pretty Asian; she nodded pleasantly to him. The other woman was a stunning, dark-haired anglo; Dilip really knew how to pick 'em. "Wil, this is Gail Parker. Gail's an EMC—"

"—ECM—" the girl corrected.

"Right, an ECM officer on Fraley's staff."

She wore thigh-length shorts, with a cotton top; he'd never have guessed she was an NM staffer. She stuck out her hand. "I've always wondered what you were like, Inspector. Ever since I was a little girl, they've been telling me about that big, black, bad-ass northerner name of W.W. Brierson—" She looked him up and down. "You don't look so dangerous." Wil took her hand uncertainly, then noticed the mischievous gleam in her eyes. He'd met a number of New Mexicans since the failed NM invasion of the ungoverned lands. A few didn't even recognize his name. Many were frankly grateful, thinking he had speeded the disgovernance of New Mexico. Others—the die-hard statists of Fraley's stripe—hated Wil out of all proportion to his significance.

Gail Parker's reaction was totally unexpected . . . and fun. He smiled, and tried to match her tone. "Well, Ma'am, I'm big and black, but I'm really not such a bad ass."

Gail's reply was interrupted by an immensely loud voice echoing across the picnic grounds. "FRIENDS—" There was a pause. Then the amplified voice continued more quietly "—oops, that was a bit much. . . . Friends, may I take a few moments of your time."

Rohan's friend said quietly, "So wonderful; a speech." Her English was

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heavily accented, but Wil thought he heard sarcasm. He had hoped that with Don Robinson's departure he would be spared any more "friends" speeches. He looked down the lawn at the speaker. It was the Peacer boss who had been talking to Fraley a few moments earlier. Dilip handed a carton of beer over Wil's shoulder. "I advise you to drink up, 'friend,' " he said. "It may be the only thing that saves you." Wil nodded solemnly and broke the seal on the carton.

The spindly Peacer continued, "This is the third week we of the Peace have hosted a party. If you have been to the others, you know we have a message to get across, but we haven't bothered you with speeches. Well, by now we hope we've 'sucked you in' enough so you'll give me a hearing." He laughed nervously and there were responding chuckles from the audience, almost out of sympathy. Wil chugged some beer and watched the speaker narrowly. He'd bet anything the guy really was nervous and shy—not used to haranguing the masses. But Wil had read up on Tioulang. From 2010 till the fall of the Peace Authority in 2048, Kim Tioulang had been the Director for Asia. He had ruled a third of the planet. So maybe his diffidence reflected nothing more than the fact that if you're a big enough dictator, you don't have to impress anyone with your manner.

"Incidentally, I warned President Fraley of my intention to propagandize this afternoon, and offered him the 'floor' in rebuttal. He graciously declined the offer."

Fraley stood up and made a megaphone of his hands. "I'll get you all at *our* party." There was laughter, and Wil felt the corners of his mouth turn down. He *knew* Fraley was a martinet; it was annoying to see the man behave with any grace.

Tioulang turned back to the mass of picnickers. "Okay. What am I trying to convince you of? To join the Peace. Failing that, to show solidarity with the interests of the low-techs—as represented by the Peace and the Republic of New Mexico. . . . Why do I ask this? The Peace Authority came and went before many of you were born—and the stories you've heard about it are the usual ones that history's winners lay on history's losers. But I can tell you one thing: The Peace Authority has always stood for the survival of humanity, and the welfare of human beings everywhere."

The Peacer's voice went soft. "Ladies and gentlemen, one thing is beyond argument: What we do during the next few years will determine if the human race lives or dies. It depends on *us*. For the sake of humanity, we can't afford to follow blindly after Korolev or any high-tech. —Don't mistake me: I admire Korolev and the others. I am deeply grateful to them. They gave the race a second chance. And the Korolev scheme seems very simple, very generous. By running her factories way over red-line, Yelén has promised to keep us at a moderate standard of living for a few decades." Tioulang gestured at the beer freezers and the barbecue pits, acknowledging their provenance. "She tells us that this will wreck her equipment centuries before it would otherwise fail. As the years pass, first one and then another of her systems will fail. And we will be left dependent on whatever resources we have developed.

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"So we have a few decades to make it . . . or fade into savagery. Korolev and the others have provided us with tools and the databases to create our own means of production. I think we all understand the challenge. I shook some hands this afternoon. I noticed calluses that weren't there earlier. I talked to people who have been working twelve, fifteen hour days. Before long, these little meetings will be our only break from the struggle."

Tioulang paused a moment, and the Asian girl laughed softly. "Here it comes, everybody."

"To this point, no sane person can have disagreement. But what the Peace Authority—and our friends of the Republic—*do resist is Yelén Korolev's* method. Hers is the age-old story of the absentee landlord, the queen in the castle and the serfs in the fields. By some scheme that is never revealed, she parcels out data and equipment to individuals—never to organizations. The only way individuals can make sense of such a hopeless jumble is by following Korolev directions . . . by developing the habit of serfdom."

Wil set the beer down. The Peacer had one hundred percent of his attention now. Certainly Yelén was listening to the spiel, but would she understand Tioulang's point? Probably not; it was something new to Wil, and he'd thought he appreciated all the low-tech reasons for resenting Korolev. Tioulang's interpretation was a subtle—perhaps even an unconscious—distortion of Marta's plan. Yelén gave tools and production equipment to individuals, according to what hobbies or occupations they had had back in civilization. If those individuals chose to turn the gear over to the Peace or the Republic, that was their business; certainly Yelén had not forbidden such transfers.

In fact, she hadn't given any orders about how to use the gifts. She had simply made her production databases and planning programs public. Anyone could use those data and programs to make deals and coordinate development. The ones who coordinated best would certainly come out ahead, but it was scarcely a "jumble" . . . except perhaps to statists. Wil looked across the picnickers. He couldn't imagine the ungoverned being taken in by Tioulang's argument. Marta's plan was about as close to "business as usual" as you could come under the present circumstances, but it was alien weirdness to the Peacers and most of the NMs. That difference in perception might be enough to bring everything down.

Kim Tioulang was also watching the audience, waiting to see if his point had sunk in. "I don't think any of us want to be serfs, but how can we prevent it, given Korolev's overwhelming technical superiority? . . . I have a secret for you. The high-techs need us more than we need them. Without any high-techs at all, the human race would still have a chance. We have—we *are*—the one thing that is really needed: people. Between the Peace, the Republic, and the, uh, unaffiliated, we low-techs are almost three hundred human beings. That's more than in any settlement since the Extinction. Our biologists tell us it is enough—just barely enough—genetic diversity to restart the human race. Without our numbers, the high-techs are doomed. And they know it.

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"So the most important thing is that we hang together. We are in a position to reinvent democracy and the rule of the majority."

Behind Wil, Gail Parker said, "God, what a hypocrite. The Peace never had any interest in elections when *they* were in the saddle."

"If I've convinced you of the need for unity—and frankly, the need is so obvious that I don't need much persuasiveness there—there is still the question of why the Peace is better a bet for you than the Republic.

"Think about it. The human race has been at the brink before. In the early part of the twenty-first century, plagues destroyed billions. Then, as now, technology remained widely available. Then, as now, the problem was the depopulation of the Earth. In all humility, my friends, the Peace Authority has more experience in solving our present problem than any group in history. We brought the human race *back* from the brink. Whatever else may be said of the Peace, *we* are the acknowledged experts in these matters—"

Tioulang shrugged diffidently. "That's really all I had to say. These are important things to think about. Whatever your decisions, I hope you'll think about them carefully. My people and I are happy to take any questions, but let's do it one on one." There was a click as he cut the amplifier.

There was a buzz of conversation. A fair-sized crowd followed Tioulang back to his pavilion by the beer locker. Wil shook his head. The guy had made some points. But people didn't believe everything he said. Just behind Wil, Gail Parker was giving the Dasguptas a quick rehash of history. The Peace Authority was the great devil of the early twenty-first century, and Wil had lived near enough to that era to know that their reputation could not be entirely a smear. Tioulang's diffident, friendly manner might soften the harsh outlines of history, but few were going to buy his view of the Peace.

What some *did* buy—Wil realized unhappily as he listened to nearby ungovs—was Tioulang's overall viewpoint. They accepted his claim that Korolev's policies were designed to keep them down. They seemed to agree that "solidarity" was their great weapon against the "Queen on the hill." And the Peacer's call for a re-establishment of democracy was especially popular. Wil could understand the NMs' buying that; majority-rule was the heart of their system. But what if the majority decides that everyone with dark skin should work for free? or that Kansas should be invaded? He couldn't believe the ungoverned would accept such a notion. But listening to those nearby, he saw that some *did* accept it. This was a matter of survival and the will-of-the-majority was working in their favor. How quickly cracks the veneer of civilization.

Brierson rolled to his feet. "I'm getting some food. Need anything more?"

Dilip looked up from the discussion with Parker. "Er, no. We're stocked."

"Okay. Be back in a little while." Wil wandered down the lawn, treading carefully around blankets and people. There seemed the same discouraging set of responses: The Peacers enthusiastic, NMs distrustful but recognizing the

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"basic wisdom" of Tioulang's speech, the ungovs of mixed opinions.

He reached the food, began filling a couple of plates. One good thing about all this deep philosophical debate: he didn't have to wait in line.

The voice behind him was a sardonic bass: "That Tioulang is really a clown, isn't he?"

Wil turned. An ally!

The speaker was a brown-haired anglo, dressed in a heavy—and none too clean—robe. At one meter seventy, he was short enough so Wil could see the shaved patch on the top of his skull. The fellow had a permanent grin pasted on his face.

"Hello, Jason." Brierson tried to keep the irritation out his voice. Of all the people here, that the only one to echo his thoughts was Jason Mudge, the cheated chiliast and professional crank! It was too much. Wil continued down the food line, piling his plate precariously high. Jason followed, not taking anything to eat, but bombarding Wil with the Mudge analysis of Tioulang's lunacy: Tioulang totally misunderstood Man's crisis. Tioulang was taking humanity back from the Faith. The Peacers and the NMs and the Korolevs—in fact, everybody—had closed their eyes to the possibility of redemption and the perils of further disBelief.

Wil grunted occasionally at the other's words, but avoided any meaningful response. Reaching the end of the line, he realized there was no way to get all this food across the lawn without slopping; he'd have to scarf some of it right here. He set the plates down, and attacked one of the hot dogs.

Mudge circled closer, thinking Brierson had stopped to listen. Once his spiel began, he was a nonstop talker. Right now, his voice was "powered down." Earlier, he'd stood on the high ground north of the lawn and harangued them for a quarter-hour. His voice had boomed across the picnic grounds, as loud as Tioulang's had been with amplification. Even at that volume, he'd spoken as fast as now, every word standing in block capitals. His message was very simple, though repeated again and again with different words: Present day humans were Truants from the Second Coming of the Lord. (That Second Coming was presumably the Extinction.) He, Jason Mudge, was the prophet of the Third and Final Coming. All must repent, take the robes of the Forgiven, and await the Salvation that was soon to come.

At first, the harangue had been amusing. Someone shouted that with all these Comings, Mudge must not only be a prophet, but the Lord's Sexual Athlete as well. Such taunts only increased Jason's zeal; he would talk till the Crack of Doom if there remained any unrepentant. Finally, the Dasgupta brothers walked up from the lawn and had a short chat with the prophet. That had been the end of the speechifying. Afterwards, Wil had asked them about it. Rohan had smiled shyly and replied, "We told him we'd throw him over the cliffs if he continued shouting at us." Knowing Dilip and Rohan, the threat was completely incredible. However, it worked on Mudge; he was a prophet who could not afford to become a martyr.

So now Jason toured the picnic grounds, looking for stragglers and other targets of opportunity. And W.W. Brierson was the current victim. Wil

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munched a curried egg roll, and eyed the other. Perhaps this wasn't entirely wasted time. Della and Yelén had lost all interest in Mudge, but this was the first time Wil had seen him up close.

Strictly speaking, Jason Mudge was a high-tech. He had left civilization in 2200. The GreenInc database showed him as a (very) obscure religious nut, who proclaimed that the Second Coming of Christ would occur at the end of the next century. Apparently ridicule is a constant of history: Mudge couldn't take the pressure, and bobbled through to 2299, thinking to come out during the final throes of the world of sin. Alas, 2299 was after the Singularity; Mudge arrived on an empty planet. As he would willingly—and at great length —explain, he had erred in his biblical computations. The Second Coming had in fact occurred in 2250. Furthermore, his errors were fated, as punishment for his arrogance in trying to "skip ahead to the good part." But the Lord in His infinite compassion had given Jason one more chance. As the prophet who had missed the Second Coming, Jason Mudge was the perfect shepherd for the lost flock that would be saved at the Third.

So much for religion. GreenInc had shown another side of the man. Up until 2197, he had worked as a systems programmer. When Wil noticed that, Mudge's name had moved several notches up the suspect list. Here was a certified nut who could reasonably want to see the Korolev effort fail. And the nut's specialty involved the sort of skills needed to sabotage the bobble failsafes and maroon Marta.

Yelén was not so suspicious of him. She said that by the late twenty-second century, most occupations involved systems. And with prolongevity, many people had several specialties. Mudge's path had crossed the Korolevs' several times since the Age of Man. The encounters were always the same: Mudge needed help. Of all the high-techs who had left civilization voluntarily, he was the most poorly equipped: He had a flier but no space capability. He owned no autons. His databases consisted of a couple of religion cartridges.

Yet he was still on Wil's list. It was a bit implausible that anyone would go this far to disguise his abilities, but Mudge *might* have something cached away. He had asked Yelén to put Mudge under surveillance, to see if he was communicating with hidden autons.

Now Wil had a chance to apply the "legendary Brierson savvy" firsthand. Watching Mudge, Wil realized the little man required virtually no feedback. As long as Wil was standing here facing him, the harangue would continue. No doubt he rarely talked to anyone who gave more. Could he respond at all once he got rolling? *Let's see*. Wil raised his hand, and injected a random comment. "But we don't *need* supernatural explanations, Jason. Why, Juan Chanson says invaders caused the Extinction."

The Mudge diatribe continued for almost a second before he noticed there had been some real interaction. His mouth hung open for an instant, and then—he laughed. "*That* backslider? I don't see why you people believe anything he says. He has fallen from the way of Christ, back into the toils of science." The last was a dirty word in Jason's mouth. He shook his head, and his smile came back broader than ever.

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"But your question shows something. Indeed we must consider that—" The last prophet moved closer and launched still another attempt to make him understand . . .

. . . and Wil really did. Jason Mudge needed people. But somewhere in his past, the little man concluded that the only way to get others' attention was with the cosmically important. And the harder he tried to explain, the more hostile was his audience—until it was a triumph to have an audience at all. If there was anything to the Brierson intuition, Yelén was right; Jason Mudge should come off the suspect list.

It might seem a small thing, the twenty-five hour day. But that extra hour and bit was one of the nicest things about the new world. Almost everyone felt it. For the first time in their lives, there seemed to be enough time in the day to get things done, enough time to reflect. Surely, everyone agreed, they would soon adjust, and the days would be just as crowded as always. Yet the weeks passed and the effect persisted.

The picnic stretched through the long afternoon, lost much of the intentness that followed Tioulang's speech, and finally shifted to the volleyball nets on the north side of the lawn. For Wil Brierson, the games were a mindless, pleasurable time. The last three weeks he'd spent so much time digging through databases and talking to people as nutty as any he'd ever known. Behind it all —even and especially in his dreams —had been a sense of failure and loss, and an anger at the murderers and shanghaiers.

It was good to find something that involved action, coordination, people —not second-guessing and analysis.

Wil played game after game. There was a constant flow of people on and off the teams. Conversations were brief, but Wil gradually realized that—whether they saw him as Korolev's cop or not —he was as popular here as he'd been in team sports . . . before. Brierson had good coordination, but no training. He enjoyed playing but winning and self-glory did not interest him. It was a combination that most grown-ups succeed in imitating, but Wil was fortunate: it came naturally to him. He could be depended on to make points and to help teammates get their share, too. His only real problem was the bull-in-the-china-shop syndrome. At ninety kilos and one meter ninety-six, Brierson could not afford to show *too* much enthusiasm. A flailing Brierson arm would be enough to knock most teammates off the court.

There were some who were more than Wil's match—Tunç Blumenthal, for instance. Blumenthal stood a bit over two meters, and had at least Wil's mass. When in the back court, or on Wil's team, he was cheerful and laid-back, maneuvering his teammates into winning set-ups. But when the two faced each other across the net, a smile of anticipation crossed Blumenthal's face, and till the serve changed, Wil had a chance to really hustle. The man had tigerish reflexes, and spiked the ball through Brierson as often as not. Even so, Wil guessed he was holding back, playing just well enough to put Wil on his mettle. Like most high-techs, Blumenthal had the coordination and physique of a professional athlete.

The sun slowly fell, a straight-down

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path that seemed faintly unreal to someone raised in midlatitudes. Shadows deepened. The green of lawn and hillsides was subtly changed by the reddening light; more than ever, the land looked like a fantasist's painting. The sky turned to gold and then to red. As twilight passed quickly into night, light panels came on at the sidelines.

Somehow, it broke the spell for Wil. When the next game ended, he left the court, had a couple beers with his teammates. When the new game started, he drifted into the dark. Less than half the partiers were involved with volleyball. There were several bonfires—cheerful yellow light compared to the blue around the courts.

Not everyone was light-hearted. There were groups sitting away from the lights. Their talk was low and intense. Wil walked past them, down to the picnic area. He retrieved his jacket, then went back a different way. Maybe these people had been having a good time earlier, and maybe they'd be socializing later on, but right now they were trying to make some hard decisions. He was almost back to the courts when he came on a large group—almost thirty people, all women. By the light of the nearest bonfire, he recognized Gail Parker and a few others. There were both ungovs and NMs here, maybe a few Peacers. Wil paused, and Parker looked up. Her gaze had none of its former friendliness. He drifted away, aware of several pairs of eyes following his retreat.

Wil shivered. He guessed the shape of their discussions. People like Tioulang could make grandiose talk about re-establishing the human race. But that re-establishment demanded tremendous birth rates, for at least a century. Without womb tanks and post-natal automation, the job would fall on the women. It meant creating a serf class, but not the one Tioulang was so eager to warn against. These serfs might be beloved and cherished—and might believe in the rightness of it all as much as anyone—but they would carry the heavy burden. It had happened before. The plagues of the early twenty-first century had killed most of the race, and left many of the survivors sterile. The women of that period had a very restricted role, very different from women before or after. Wil's parents had grown up in that time: the only serious fights he could remember between them involved his mother's efforts to start her own business.

A motherhood serfdom would be much harder to establish this time around. These people were not coming back from plagues and a terrible war. Except for the Peacers, they were from the late twenty-first and the twenty-second. The women were highly trained, most with more than one career. As often as not, they were the bosses. As often as not they initiated romance. Many of those from the twenty-second were sixty or seventy years old, no matter how young and lush their bodies. They were not people you could push around.

. . . And yet, and yet Gail and the others could see final extinction waiting irrevocable in the very near future . . . unless they made some terrible sacrifices. He needed no imagination to understand their intent discussion or Gail's unfriendly stare. Which sacrifices to make, which to decline. What to demand, what to accept. Wil was very glad he wasn't welcome in their councils.

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Something moon-bright rose into the air ahead of him, quickly fell back. Wil looked up, and broke into a trot, trying to put the darkness out of his mind. The light rose again, sweeping fast-moving shadows across the lawn. Someone had brought a glowball! A crowd had already gathered along three sides of the volleyball court, blocking his view. Brierson edged around till he could see the play.

Wil found himself grinning stupidly. Glowballs were something new, just a couple months old . . . at the time he was shanghaied. It must be old hat to most of the ungovs, but it was a complete novelty to the Peacers and even to the NMs. The ball had the same size and feel as a regulation volleyball—but its surface was brightly aglow. The teams were playing by this light alone, and Wil knew the first few games would be comic relief. If you kept your eye on the ball, then little else was bright enough to see. The ball became the center of the universe, a sphere that seemed to swell and shrink while everything else swung around it. After a few moments, you couldn't find your teammates—or even the ground. The NM and Peacer players spent almost as much time on their butts as standing. Laughter swept the far side of the court as three *spectators* fell down. This ball was better than the others Wil had seen. Whenever it touched out-of-bounds, it chimed and the light changed to yellow. *That* was an impressive trick.

After a time, the players learned the proper strategy. Less and less did they watch the ball directly. They watched each other. Most important, they watched the *shadows*. With the glowball, those shadows were twisting, shifting fingers —showing where the ball was and where it was going.

The games went quickly, but there was only one ball and many wanted to play. Wil gave up any immediate plans to get on the court. He wandered around the edge of the crowd, watching the shadows flick back and forth, highlighting a face for an instant, then plunging it into darkness. It was fun to see people as fascinated as kids.

One face stopped him short: Kim Tioulang stood at the outskirts of the crowd, less than five meters from Brierson. He was alone. He might be a boss, but apparently he didn't need a herd of "aides" like Steve Fraley. The man was short, his face in shadow except when a high shot washed him in a quick down-and-up of light. His concentration was intense, but his expressionless gaze contained no hint of pleasure.

The little man was strikingly frail. He was something that did not exist in Wil's time—except by suicidal choice or metabolic accident. Kim Tioulang's body was *old*; it was in the final stages of the degeneration which, before the mid twenty-first, had limited lifespans to less than a century.

There were so many different ways to think of time now. Kim had lived less than eighty years. He was young by comparison with the "teenagers" from the twenty-second. He had nothing on Yelén's three hundred years of real time experience or the mind-destroying stretch of Della's nine thousand. Yet in some ways, Tioulang was a more extreme case than either Korolev or Lu.

Brierson had read the GreenInc summary on the man. Kim Tioulang was

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born in 1967. That was two years before Man began the conquest of space, thirty years before the war and the plagues, at least fifty years before Della Lu was born. In a perverse sense, he *was* the oldest living human.

Tioulang had been born in Kampuchea, in the middle of one of the regional wars that pocked the late twentieth. Though limited in space and time, some of those wars were as horrible as what followed the 1997 collapse. Tioulang's childhood was drenched in death—and unlike the twenty-first century plagues, where the murderers were faceless ambiguities, death in Kampuchea came person-to-person via bullets and hackings and deliberate starvation. GreenInc said the rest of Tioulang's family disappeared in the maelstrom . . . and little Kim ended up in the USA. He was a bright kid; by 1997 he was finishing a doctorate in physics. And working for the organization that overthrew the governments and became the Peace Authority.

From there, GreenInc had little but Peacer news stories and historical inference to document Tioulang's life. No one knew if Tioulang had anything to do with starting the plagues. (For that matter, there was no absolute proof the Peace had started them.) By 2010, the man was Director for Asia. He'd kept his third of the planet in line. He had a better reputation than the other Directors; he was no Christian Gerrault, "Butcher of Eurafrica." Except for the Mongolian insurrection, he managed to avoid large-scale bloodshed. He'd remained in the saddle right up to the fall of the Peace in 2048—and that fall was for Tioulang less than four months passed.

And so, even though Kim Tioulang predated the rest of living humanity by scant decades, his background put him in a class by himself. He was the only one who had grown up in a world where humans routinely killed other humans. He was the only one who had ruled, and killed to stay in power. Next to him, Steve Fraley was a high school class president.

An arching shot lifted the glowball above the crowd, putting Tioulang's face back in the light—and Wil saw that the Peacer was staring at him. The other smiled faintly, then stepped back from the crowd to stand beside Brierson. Up close, Wil saw that his face was mottled, pocked. Could old age alone do that?

"You're Brierson, the one who works for Korolev?" His voice was just loud enough to be heard over the laughs and shouting. Light danced back and forth around them.

Wil bridled, then decided he wasn't being accused of betraying the low-techs. "I'm investigating Marta Korolev's murder."

"Hmm." Tioulang folded his arms and looked away from Wil. "I've done some interesting reading the last few weeks, Mr. Brierson." He chuckled. "For me, it's like future history to see where the next hundred and fifty years took the world. . . . You know, those years turned out as well as ever I could hope. I always thought that without the Peace, humankind would exterminate itself. . . . And maybe it did eventually, but you went for more than a century without our help. I think the immortality thing must have something to do with

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it. Does it really work? You look around twenty years old—"

Brierson nodded. "But I'm fifty."

Tioulang scuffed at the lawn with his heel. His voice was almost wistful. "Yes. And apparently I can have it now, too. The long view—I can already see how it softens things, and how that's probably for the best.

"I've also read your histories of the Peace. You people make us out as monsters. The hell of it is, you have some of it right." He looked up at Wil, and his voice sharpened. "I meant what I said this afternoon. The human race is in a bind here; we of the Peace would make the best leaders. But I also meant it when I said we're willing to go with democracy; I see how it could really work.

"You are very important to us, Brierson. We know you have Korolev's ear—don't interrupt, please! Any of us can talk to her whenever we wish, but we think she respects your opinions. If you believe what I am telling you, there is some chance she may too."

"Okay," said Wil. "But what *is* the message? You oppose Yelén's policies, want to run things under some government system with majority rule. What if your people don't win out? The NMs have a lot more in common with the ungovs and the high-techs than you. If we fall back to a government situation, they are more likely to be the leaders than you. Would you accept that?" *Or grab for power like you did at the end of the twentieth?*

Tioulang looked around, almost as though checking for eavesdroppers. "I expect we'll win, Brierson. The problems we face here are problems the Peace is especially well-equipped to handle. Even if we don't win, we'll still be needed. I've talked to Steven Fraley. He may seem rough and tough to you . . . but not to me. He's a little bit of a fool, and likes to boss people around, but left to ourselves, we could get along."

"Left to yourselves?"

"That's the other thing I want to talk to you about." He shot a furtive glance past Wil. "There are forces at work Korolev should know about. Not everyone wants a peaceful solution. If a high-tech backs one faction, we—" The swinging light splashed over them. Tioulang's expression suddenly froze into something that might might have been hatred . . . or fear. "I can't talk more now. I can't talk." He turned and walked stiffly away. ■

CONTINUED IN NEXT ISSUE

● When a man wants to murder a tiger he calls it sport: when the tiger wants to murder him he calls it ferocity. The distinction between Crime and Justice is no greater.

George Bernard Shaw

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the reference library

By Tom Easton

Wild County, Dean Ing, TOR, $2.95, 317 pp.
The Sword and the Tower, Justin Leiber, TOR, $2.95?, 216 pp.
Voyagers II, Ben Bova, TOR, $15.95, 352 pp.
Speaker for the Dead, Orson Scott Card, TOR, $15.95, 432 pp.
Human Error, Paul Preuss, TOR, $14.95, 351 pp.
Venus of Dreams, Pamela Sargent, Bantam, $3.95, 544 pp.
Always Coming Home, Ursula K. Le Guin, Harper & Row, $25.00, 525 pp., + cassette.

It's astonishing, and totally inadvertent on my part. You may take the preponderance of TOR books in this month's column as a sign that that one publisher seems to have an editorial taste much in line with my own. At least, TOR's authors and titles are the ones that struck me as worth reading this time. I may have changed my mind once I got into some of them, but that's another matter and the point of the Reference Library.

Do please note that some months I cover very few TOR books. Sometimes it's Bantam that appeals to me, or Ballantine/Del Rey, or Baen, or . . . whatever. None of us can claim to be totally consistent, for our tastes do vary.

I don't recall reading Dean Ing's *Systemic Shock* and *Single Combat*, the first two volumes in the trilogy he concludes with **Wild Country**. Now I wish I had. *Wild Country* is an excellent tale of an America shattered by an apparently "limited" nuclear war but now rebuilding. The first two volumes gave us the immediate aftermath of the disaster, with hero Ted Quantrill an assassin controlled by a fanatically religious government. He joined the underground, despite the device in his skull that his masters could detonate at any moment, and he helped the return of responsible

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government. Now he works part-time as a deputy marshall in a lawless segment of Texas whose ambience reminds strongly of "West of the Pecos" cowboy flicks and novels. Ranchers confront homesteaders, and guns blaze in the night.

There are differences, of course. Quantrill also works for the vet at a grand and glorious amusement park and game ranch that attracts the wealthy from all over the world. The Mexican playboy Felix Sorel runs hard drugs through Wild Country to sap the rest of the nation, aided and abetted both by Israeli space colonists and the rancher's villainous son, who also covets the homesteader, Sandy, loved by Quantrill. Ba'al, a giant boar, relic of Texas Aggie genetic experimentation, roams the range with a small girl, Sandy's kid sister, astride his back. A British toff, used to sticking ordinary pigs, decides to hunt the biggest pig he's ever heard of. Quantrill must help, even as he worries for his future sister-in-law's pet, but Ba'al is more than capable of taking care of himself. At the same time, he must track the druggers, deal with treason in his own camp, peddle Sandy's hidden treasure, a matter duplicator, to the government, and come to terms with his own growing sense of mortal maturity.

Ing dovetails his various plots and subplots very nicely. The action is unrelenting, with the toff's pursuit of Ba'al a nicely comic relief from the more vicious manhunting. The characters support the story very nicely, for Quantrill, Sandy, Sorel, and others are well rounded and easy to sense as real people. Perhaps a touch distractingly, the most sympatico character of them all is Ba'al, whose intelligence and sense of honor shames most of the people around him.

Ing's theme seems to be the need of most men for a hard kick in the tail before they can give up childish things and grow up. The toff gets his kick from Ba'al. Quantrill gets his as well. But they are only stand-ins for the human species as a whole. Ing seems to fear that it will take a third world war to make us smarten up, and that maybe even that won't work.

As promised, Justin Leiber explains the world of *The Sword and the Eye* in its sequel, **The Sword and the Tower**. Fairly early in the book, it becomes obvious that that world is not Earth, for its fossil trilobites have four lobes (there are also too many moons), yet the people are truly human, for their nursery rhymes are our own, their origins totally lost in the dim mists of time. Clearly, the people are descended from space colonists. The villains, the priests of the Eye, seem either the catspaws of the mad computer of the original colony ship or minions of interstellar invaders. Their voice-casting amulets, or radios, their rare rifles, and their single stun rod can be nothing else than artifacts of technical civilization.

We learn all this as we follow young Kinch Eigin, newly ascendent scion of a royal line, his lover the teen-aged seer Arlynn, and their seven companions down the road from their northern home to the seat of the Rome-like Imperium. Unlike *Eye*, *Tower* is largely a travelog until the travelers join the Imperial forces for their grand battle with the forces of the Eye, defeat the chief priest, and learn the full story of that fell religion, begun in the visions of a founder who, delirious with desert dehydration, ran into a mystery.

The story's greatest defect is the dreadful mockery of antique language Leiber chose to match the technological level of his tale's people. The defect may be in my own knowledge of older

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forms of English, for Leiber *is* a philosopher of language, but there seem far too many inconsistencies and redundancies for accuracy of any form. That aside, the story is an interesting vision, with many nice touches, of how a colony world might develop if left alone for thousands of years.

In *Voyagers*, Ben Bova gave us a visiting starship that was actually a sarcophagus, bearing a dead alien with its gift of technology and vision. American and Soviet astronauts went up to meet it, but events conspired to make it likely that Earth would pass up the gift entirely. To make that less likely, Keith Stoner stayed on the alien craft when the others returned to Earth, opening his suit to the cold of space and trusting that his sacrifice would bring humanity back to get him, and the ship.

In **Voyagers II**, we see how right he was in his expectations. It took the girl who loved him, Jo Camerata, six years to raise to sufficient corporate power to mount the necessary expedition. Then, while he waited in cryogenic splendor for Vanguard Industries' scientists to figure out how to wake him, Vanguard looted wonders from the alien ship. It was another twelve years before Stoner woke, and in that time Vanguard, under the paranoid leadership of Jo's husband, Nillson, came to dominate the world, owning governments and egging on both sides in wars small and large.

Voyagers II begins with Stoner's waking. We soon learn that something is amiss, for he seems to have an extra presence—the "soul" of the alien—in his head, imprinted there during his long sojourn in space. The alien seems to be an observer, but it is also a controller, governing Stoner's emotional responses. Yet to it Stoner may owe his life, for he is the first and only to awaken successfully from freezing. Tests on volunteers have produced only gruesome deaths.

In due time, Jo and Stoner meet and we see signs that their old love would revive if allowed. But corporate politics and alien goals both interfere. Stoner escapes the Vanguard grip to wander the world, ducking death at every turn while he explores the nature of the human madness. The focus here is on the war in Africa, and we see something of the alien's drives in Stoner's delusion that he can stop the war. Or is it a delusion? His hypnotic power to make people do what he wishes brings success closer and closer.

Bova's concern here is war and peace. Repeating his argument in *Assured Survival*, he shows us the International Peace Enforcers in action, though without much success. That comes only when Stoner gets the leaders of the various factions together to discover that peace is possible after all. My reaction is that such a process might work, but it never has. Bova is far too sanguine. Worse yet, though his tale is well crafted and interesting, it does limp under the burden of too heavy a pot of message.

Last July, I heartily recommended Orson Scott Card's *Ender's Game*. Now that book too has a sequel, **Speaker for the Dead**. *Game* left child military genius Ender Wiggin full of remorse after having destroyed the alien buggers, and gifted with a chance for redemption. He had come across a last surviving bugger queen (the aliens are hive creatures) and accepted the duty to find it a place to reestablish its species. He had also written a great and influential work, *The Hive Queen and the Hegemon*, using the pseudonym of "Speaker for the Dead."

Speaker takes place some three thou-

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sand years later. Ender still lives, for his civilization is one of slower-than-light travel and instantaneous communication via ansible (a bugger invention). His pseudonym has become his—and others'—profession, for there is a need for people who can be summoned by ansible to travel to a world where someone's life needs explanation to his or her survivors and heirs. It is the time dilation of frequent relativistic travel that has kept Ender and his sister, Valentine, around for thirty centuries.

Like *Game*, *Speaker* deals with issues of evil and empathy, though not in so polarized a way. Soon after Lusitania's colonization, the planet turned out to have a native sentient species, the piggies. The authorities immediately curtailed the colony's activities, surrounding it with a fence that only the colony's two xenologists could cross. The xenologists in turn were barred from revealing human technology or culture, while the biologists could study only what was within the fence. A plague strikes, the biologists find a cure but they die, leaving their daughter, Novinha, alone. In time, she allies with the xenologists, Pipo and his son Libo, and finds joy. But then Novinha links the plague with the peculiarities of piggy biology, Pipo goes to the piggies to check her discovery out, and the piggies kill him in a remarkably gruesome way. Riddled with guilt, Novinha buries her discovery for fear that it will kill Libo too, refusing to marry him because marriage would give him access to her files. But the piggies kill him anyway.

Speaker is a tale of guilt and tragedy driven by fear of the alien, by lack of empathy. When news of the "murders" reaches the rest of human civilization, the fear that the piggies may be another variety of buggers enters the equation. And then Ender arrives, drawn to be Speaker for the Dead, to explain the deaths of Pipo, Libo, and Novinha's maddened husband, Marcão. His clear vision, his depth of insight into the human soul, drawn from his own hell of guilt, soon resolve all problems. The colony rebels, an interspecies accord takes shape with grand promise for the future, and Ender achieves his own joy.

Less brash than *Ender's Game*, *Speaker for the Dead* may be a much better book. Don't miss it, and be prepared for another sequel. Card does leave room for one.

Paul Preuss's **Human Error** is not as good as his excellent *Broken Symmetries*. Like the latter, it centers on novel advanced technology, here the intersection between biochemistry and computers that will appear the day we learn to make viruslike, self-reproducing circuitry out of proteins and nucleic acids. They're a lovely idea, these biochips, and they do seem likely to come. And they offer hazards enough to keep SF writers busy for years to come. They're compatible with human chemistry, you see, and they just might be able to grow within the human body, with thoroughly fantastic results. Greg Bear gave us one vision with *Blood Music*. Preuss's vision is more restrained, and hence perhaps more appealing. The world is not destroyed, though people are changed.

Preuss begins with the meeting of computer wizard Toby Bridgeman with pathologically disheveled and flamboyant Adrian Storey, the genius behind Compugen's successful introduction of organic computers. Together, they add self-reproduction to the biochips, and the Tyger II—small, cheap, and self-expanding in response to a program's needs—hits the market. It's a brightly burning, instant success, but it makes

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secret government cryptography agencies alarmingly obsolete and its users start getting sick. Adrian is the first; his symptoms resemble schizophrenia, parkinsonism, and other neurological ailments, and there seems to be no explanation. Toby, reluctantly in love with Adrian's psychiatrist, gropes his way toward the realization that Adrian is being taken over by his computer, and then toward acceptance of what seems ultimately a benign accident.

I liked Preuss's characters. The self-withholding Toby seems very real as he struggles against love and friendship. The much-rejected Adrian is a model of both the traditional SF fan and the grungy computer genius. Dr. Joana Davies, her twin sister, her mongoloid nephew, the quarter-saving salesman, the sax-waving cryptographer, and more, all bring zesty life to the tale. However, there are serious defects. For one thing, gaps in the story, there perhaps because Preuss or his editor wished to shorten the tale, give it an occasionally choppy, incomplete feel. Worse, there is a basic unlikeliness, for our government has a way of playing watchdog over new biotechnology, and I doubt very much that they will have gotten tired of the role by the time biochips are real. At the very least, the NIH, EPA, FDA, etc., will insist on knowing what could happen if the biochips were injected into a mouse or monkey. And such a test would instantly make a story like *Human Error* impossible. I would have suspended my disbelief much more readily if Preuss had had his biochips escape into the populace despite regulatory fiats blocking the marketing of the Tyger II.

There is also the problem of the missing character. The real world has Jeremy Rifkin, notorious for his paranoid fears of biotechnology and his lawsuits to block tests. A fictional parallel would have helped Preuss's believability still more, and it would have been nice to see the Tyger II's effect on such a person.

Pamela Sargent's latest, **Venus of Dreams**, is a thoroughly, lovingly imagined family saga with much of the feel of a historical romance, even if it is set some six centuries hence. Unlike many writers, she posits drastic historical change. The present superpowers are no more, having spawned the Habitats in space. On the utopian Earth, the Mukhtars, sprung from today's Third World, rule as distant, benign father figures over millions of children. They are aided by ubiquitous Counselors, who function much like psychiatrists; the political mode echoes of China, with heavy reliance on peer pressure to keep people in line. The story begins in the Plains of North America, in the town of Lincoln, not far from the ruins of today's Lincoln, Nebraska. The people there, like the peasants of today's Italy, Greece, Egypt, or Iran, look back with pride to the days when their ancestors ruled the world, but they accept their present lot.

Culture is different, too. Lincoln's people are matrilineal farmers. Girl children grow up to stay in Lincoln, sharing the life of farms and communes, concerned with the perpetuation of their lines. Boys grow up to leave home and wander the world as mechanics, technicians, and laborers, mating with the women who choose them in their temporary billets. Some go into space, for despite the separation of Mukhtars and Habitats, Earth has its satellites and space industries, and it has a grandiose Project, the terraforming of Venus.

Into this context is born Iris Angharads (Angharad Julia's daughter). A

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bright child, she discovers that she can learn far more from the commune's computers than the lessons traditionally deemed proper for a farmer. Encouraged by her grandmother, Julia, she successfully defies her mother's attempt to stop her studies. As she learns and shows intellectual promise, she gains subsidy and further encouragement from the government. She dreams of working on the Venus Project, but family conflicts discourage her and she despairs of ever being able to leave the stultifying environs of Lincoln. When Liang Chen, a worker banished from the Project for too much friendliness with a Habber, comes to town, she discovers a kindred soul, falls in love, and—heresy in Lincoln!—takes him as a bondmate. She gets pregnant with his child, Benzi, and then she is offered her chance to leave home for some real schooling.

She leaves her child, of course. How else can she fulfill herself, even if it hurts? She studies, learns her limits, sees Chen return to the Project, and finally retrieves her son and goes to Venus herself. Her dreams are fulfilled, but they soon sour. Her bond with Chen weakens in the face of her dedication to work and advancement, until near disaster brings them close again. Benzi grows up estranged, and he finds his own dream. When he pursues it beyond the Mukhtars' pale, Iris and Chen both suffer, but their own dream sustains them until the climactic, rebellious crisis.

Venus of Dreams is a tale of dreams, of Venus in both her senses, of pioneers in space. It has a lot going for it, too. The characters are real, their crises and preoccupations those of real life, their resolutions likely, and Sargent does not muck the story up with lengthy, dreary, internal monologs. But—it took me a week to wade through the thing. Too much of the action is purely psychological. We see too much of what the characters are and not enough of what they do. We do not even see the technology of Sargent's future closer than arm's length. Despite all the book's sterling qualities, I suspect that readers of this magazine will, like me, find it a laborious read. Some will find it a bore.

Any book by Ursula K. Le Guin is an E*V*E*N*T. I was therefore delighted to find **Always Coming Home** in my mailbox. And when I opened the package, the contents looked charming. For one thing, there was a cassette tape of a number of the songs in the book, and the music had an interestingly oriental feel, the language Le Guin had made up (I presume) for her people sounded real, and the strange instruments being played worked nicely. For another thing, the "liner notes" accompanying the tape conveyed an atmosphere of anthropological inquiry, setting up the book as a set of field notes in a way that was continued very effectively in the book itself. Here, I said to my wife, was an ambitious intellectual construct, a culture imagined and created in loving, complete detail, an awesome head game.

And that it was. *Always Coming Home* isn't a novel at all, though it does contain the story of Stone Telling, a woman of the Kesh whose soldier father sired her when passing through and returned to take her with him, back to the militaristic City from which he hails. There she learns to her anguish the pain of living as chattel in a male-dominated society that dreams of conquering the world. As that society collapses under its own weight, she escapes and returns home to the Valley of the Na, where women dominate the culture, as they should, and all of life is geared to co-

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operation with Nature, to stability and peace and joy.

Stone Telling's tale is broken into three pieces. Between them, Le Guin intersperses the observations of a cultural anthropologist. There are discussions of rituals and customs, samples of poetry, tales, and lessons. Together with Stone Telling's history, they make the contrast between the Valley and the City as bold as anyone might wish, while Le Guin herself, as "Pandora," steps in from time to time to comment. "The Back of the Book" adds a long list of further discussions of kinship practices, artifacts, and more.

It's not a novel. Even Le Guin seems to say so, as when on p. 163 she writes: "A story has a beginning, a middle, and an end, Aristotle said, and nobody has proved him wrong yet; and that which has no beginning and no end but is all middle is neither story nor history. What is it, then?" Perhaps it is her attempt to prove Aristotle wrong, for her tale *is* all middle, and if we agree that she has created a new kind of novel, she has succeeded.

Always Coming Home describes a utopian culture with astonishing depth and consistency. The Kesh and their neighbors belong to a time millennia hence, long after technological civilization has fallen, leaving a heritage of chemically and radiologically poisoned environments, of mutated genes and a high incidence of birth defects, of exhausted resources, of a vast computer network, the City of the Mind, that extends into space, has terminals in every settlement, and serves as a collective race memory that can answer any question, as long as one knows how to ask it.

Call it a novel if you wish. It's not in the traditional form, with plot and focal characters and resolution. But it does tell a story of the imagination. It has a point too, for the meek, Le Guin says, really will inherit the Earth. She is clearly offering an indictment of technological civilization: "This is a mere dream dreamed in a bad time, an Up Yours to the people who ride snowmobiles, make nuclear weapons, and run prison camps by a middle-aged housewife, a critique of civilisation possible only to the civilized, an affirmation pretending to be a rejection, a glass of milk for the soul ulcered by acid rain, a piece of pacifist jeanjacquerie, and a cannibal dance among the savages in the ungodly garden of the farthest West." (p. 316)

Is it as message-heavy as that line makes it sound? The message is there, but it intrudes only occasionally (as if Le Guin wished to make quite sure that you got her point), and rather than interfere with the book, it adds to it. The whole is a uniquely satisfying triumph of the imagination, even as it flips a vigorous bird at its many targets. ■

● An expert, according to a favorite definition of Niels Bohr, is a man who by his own painful experience has learned all the mistakes that can be committed in a narrow field.

Edward Teller

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brass tacks

Dear Dr. Schmidt:

I'm supposed to be grading student papers, but the mail came, bringing your December issue with editorial "In/ Deduction" which successfully tempted me away from the papers.

As usual, your words touched off strings and nets of thoughts, ripples in a pool already disturbed by the day's work, so—

What you're saying, I think, can also be: it's a lot easier to understand the instruction manual after you've operated the equipment.

Yet you need the manual (in most cases) before starting to operate the equipment.

It just doesn't work to read without operating, or vice-versa. But the human brain has learned to do it, in just about everything.

When I studied weather under the kind auspices of my Uncle Sam, it was a lot easier to understand the behavior of fronts and storm surfaces because as a child I had sat for hours and watched the waves at the shore. Anyone would have agreed that that was idle, useless, a waste of time. You need the analog before the digital? That sounds wrong somehow.

Oddly, it ties in with my student papers about problems in learning reference books and procedures. Students comment all the time that the textbooks and manuals make little sense unless you are already an active library user as a layman. Yet you cannot become a skilled reference librarian simply by repeated use as a layman—you need the organized, printed, structured presentation of principles too. There is no satisfaction like that gained when you feel the two coming together, feeding back on each other, faster and faster, until structure is indistinguishable from practice.

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A great artist once said that to draw the human figure, learn all about anatomy—then forget it. But no one learns human anatomy without having first been exposed to it without theory, if only to see himself in a mirror. So it's impossible, in most fields, to teach theory to someone who has had NO prior exposure to the subject informally.

As in your discussion of language: Your sisters had surely been exposed to Spanish, in movies, etc. before the class happened.

Well, many thanks for stimulating the structure here, which tends to get cobwebbed unless tickled or stabbed occasionally with new ideas or new things.

RINEHART S. POTTS

Glassboro, NJ

Dear Mr. Schmidt:

I'm amazed (astounded would be more apropos) that Marvin Leffler in "The Case of the Gring's Mill Goblin," December 1985, had to resort to disguising himself as a goblin to protect the secret since he was, most probably, a ghost.

The author conjectures, page 67, that the photograph on the mantel is, perhaps, that of Leffler's widow. If that be true, then he must, according to the definition of widow, be dead and his apparition a ghost.

MANUEL QUINTERO

Annandale, VA

Gentlefolk:

Your editorial "Speak for Yourself," and the responses in the December '85 issue, clearly point out the problems within our political system, but you all segue around the only rational solution. Dump the whole mess, get back to basics, and start over.

The universal franchise is supposed to yield consensual government, but obviously it cannot do that as long as it is open to the manipulations of which we are all aware.

People will continue to attempt manipulation of government, since the rewards for such actions are so great, and they will succeed as long as money and the media exposure it brings are the mother's milk of politics.

If we accept the need and desirability of consensual government, and the inevitability of attempts at influence buying, then we have—"The Wallis Plan."

Some 1200 "Nielson" families determine what we all will watch on TV. I am confident that statisticians could calculate some minimum number of randomly selected legislators that would truly reflect a national consensus, and a true random process for selecting those legislators. Freed of the need (or even the possibility) of extending their stay at the public trough by their votes, these legislators would vote to benefit themselves on their return to private life. This could not but help the rest of us private lifers. (And we could pay them the same rate as jurors or draftees, either cutting our legislative budget or making our other conscript's lives more bearable.)

Critics would claim that a true random selection of legislators would ensure a congress containing criminals, nuts, idiots and senile fools, but then who would notice the change? There would, of course, be fewer lawyers and more women in congress. Ah-h-h-h-h-h!

The "Wallis Plan" would openly sell the presidency to the highest bidder. Anyone wishing to be president would have an account opened in his or her name at the Treasury. Supporters would send tax-deductable donations to their candidates' accounts, and whoever had the largest balance election day would be president for 4 years. All the money

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of both winners and losers would go into the general fund.

Critics might say that this scheme would ensure that the presidency went to the candidate with the most money at his or her beck and call, but then when has it been otherwise? And with this source of revenue, all other taxes would probably become redundant.

The "Wallis Plan" would be a 2-legged stool were I to leave out the judiciary. The obvious solution would be either to sell justice to the highest bidder, in which case little difference would be perceptible, or to submit both civil and criminal disputes to arbitration in accordance with the rules of the A.A.A. Even trial by combat might make more sense than our present system. The poor and weak would still get screwed, but then, haven't they always?

If someone detects a bit of the *The Moon is a Harsh Mistress* here, they would be right. And if R.H. or some other competent wordsmith wants to flesh out my letter into a novel, a "Major Motion Picture" or even a Constitutional Amendment, all I ask for is an autographed copy. Living under "The Wallis Plan" will be reward enough.

WALTER E. WALLIS

It's an interesting idea—but do you really believe that legislators voting "to benefit themselves on their return to private life" "could not but help the rest of us private lifers"?

Sir:

You and your staff have done a great disservice to the late Mr. Samuel Clemens in attributing to one Jerry Buchmeyer a "saying" which is rightfully the work of the former.

Writing under his customary pseudonym, the author of *Pudd'nhead Wilson* headed each chapter with some interesting witticisms. You will find the referenced statement heading Chapter 15.

DAVE BROOKE

Seattle, WA

and further . . .

GIVE CREDIT WHERE CREDIT IS DUE DEPT.

Someone once asked Andrew Carnegie (1835–1919) how to get rich. His reply: "Put all you eggs in one basket—and watch the basket."

He was known as the Scottish Steel Maker (Carnegie Steel merged to found U.S. Steel Co.). While it is fashionable today to relegate this multi-millionaire to obscurity, he gave away millions to start the public library system in this country and to countless other educational philanthropies (among them Tus in Alabama, at that time the only Negro University in the U.S.).As he was self taught he believed education to be the key to the future. He emigrated here from Scotland at the age of 13 and his first job was for less that $1 a week.

ROBERT L. FARNSWORTH, SR.

When a quotation becomes sufficiently known and widespread, it becomes hard to trace its original source. We received several letters on this one—with several different "correct" attributions and variations on the wording.

Dear Editors:

I wish to congratulate you on printing "Snapshot of the Soul" by P.M. Fergusson in your Mid-December issue. There are many elements that, to me, make it the most memorable short story I've read since I read another story centering around the Roman Catholic faith, "The Star." As a Roman Catholic, I've found much in contemporary writing that mocks religion, and my religion, without any respect given the people

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who hold to it. "Snapshot" presented a fine analysis of the moral dilemma that a Catholic, indeed any religious person, would face in reconciling the technology at hand with the challenge of investigating a basic tenet of the faith.

Perhaps more than anything else, I found this story to be one of the most thought provoking that I've read in many years. That is surely because it so forcefully brought me to question my own understanding of the soul, of the role of evil in the world, and my ability to look at the faith in terms of contemporary technology. Indeed, it would seem like a most fascinating project to undertake. But the most important thing here is the way the story stirs questions in my mind. If science fiction serves any useful purpose besides mere entertainment—and for some entertainment is no "mere" diversion—it must be in the ability the story has to bring new questions into one's consciousness, questions not obtainable through more conventional story-telling techniques.

This is indeed the most thought provoking story I've read in many years, and, as it deals with my heritage, it is one of the most gratifying I have ever encountered of any genre.

STEVE SCONFIENZA

New Paltz, NY

Dear Dr. Schmidt:

I found the story "Snapshot of the Soul" in the mid-Dec. issue the most interesting, in fact fascinating, of the stories I've read in *Analog* for a long time. (I don't always read all of them.) I was disappointed, however, that there wasn't a science fact article, which I always read first. I hope this was only an isolated event, not the beginning of a new policy.

There are some interesting possibilities in the story which the author didn't mention. For instance, there are some people who would, or should, welcome a total destruction of their souls, either by atomic explosion or any other way, if it were possible. I mean those who feel that they are probably going to Hell. Wouldn't any sensible person prefer instant, permanent oblivion to an eternity of torture? Even if someone felt that his chances were 50-50 of going to either Heaven or Hell, I think he would be wise to choose oblivion, at those odds, since pain is more intense than pleasure, at least on this earth. And if he missed the joys of Heaven, he would never know it.

Some other interesting, although unanswerable questions: If the Universe eventually comes together and is squeezed into nothingness, in the Big Crunch, what becomes of the soul? It is claimed that space didn't exist before the Big Bang, so it perhaps wouldn't exist after the Big Crunch, and that wouldn't leave any other place for the soul to go.

Another question: wouldn't both Heaven and Hell also be crushed into nothingness in the Big Crunch, and cease to exist? It would seem that Eternity would then end for both the happy and tormented souls.

ROBERT D. SMITH

Swisher, IA ■

● A man who dares to waste one hour of time has not discovered the value of life.

Charles Darwin

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a calendar of analog upcoming events

29 May-1 June
LEPRECON 12 (Phoenix area SF conference) at the Ramada Inn Airport North, Phoenix, Ariz. Guests of Honor—Kim Poor, Donald and Elsie Wollheim, Peggy Crawford. Registration—$17 until 1 May, $20 thereafter. Info: Leprecon, Box 16815, Phoenix AZ 85011.

4-6June
Seventh National Educational Computing Conference (ACM,SCS) at San Diego, Cal. Info: Susan M. Zgliczynski, University of San Diego, School of Education, Alcala Park, San Diego CA 92110. (619) 293-4538.

6-8 June
X-CON X (Milwaukee area SF conference) at Olympia Spa and Resort, Milwaukee, Wisc. Guest: Steven Brust. Info: X-Con Ltd., Box 7, Milwaukee WI 53201.

6-8 June
HATCON 4 (Connecticut SF conference) at Ramada Inn, Danbury, Conn. Editor Guest of Honor—Susan Allison, Publisher Guest of Honor—Roger Cooper, Art director Guest of Honor—Gene Mydlowski. Registration—$15. Info: Hatcon, Box 855, Danbury CT 06810.

6-8 June
SOONERCON—1 (Oklahoma SF conference) at Hilton Inn Northwest, Oklahoma City, Okla. Guest of Honor—Gene Wolfe, Art Guest of Honor—Ellisa Schob, TM—Tom Disch, Fan Guest of Honor—Mary Wallbank. Registration—$10 until 1 April, $15 at the door. Info: Soonercon-1, Box 1701, Bethany OK 73008. Include S.A.S.E.

13-15 June
AD ASTRA VI (Toronto area SF conference) at Howard Johnson Airport Hotel, Toronto, Ont. Guests of Honor—Roger Zelazny, Kelly Freas, Steven Brust. Registration—$15 until 15 May, $20 thereafter. Info: Ad Astra VI, Box 7276, Stn A., Toronto, Ontario M5W 1X9, CANADA.

16-19 June
1986 National Computer Conference (ACM, AFIPS, DPMA, SCS) at Las Vegas, Nev. Info: AFIPS, 1899 Preston White Drive, Reston VA 22091. (703) 620-8900.

3-6 July
HALLEYCON/WESTERCON 39 (West Coast SF conference) at Town and Country Hotel, San Diego, Cal. Guest of Honor—David Brin, Fan Guest of Honor—Karen Turner, TM—Greg Bear. Registration—$30 until 28 February, $35 until 31 May, higher at the door. Info: Westercon 39, Box 81285, San Diego CA 92138.

4-6 July
NYCLONE (New Jersey SF conference) at Holiday Inn/Howard Johnson Motor Lodge, South Plainfield, N.J. Guest of Honor—Alexis Gilliland. Registration—$18 until 1 April, $20 until 1 June, $25 at the door. Info: Robert Sacks, 4861 Broadway #5V, New York NY 10034. Include S.A.S.E.

28 August-1 September
CONFEDERATION (44th World Science Fiction Convention) at Atlanta, Georgia. Guest of Honor—Ray Bradbury, Fan Guest of Honor—Terry Carr, TM—Bob Shaw Registration—$25 supporting; $55 until 15 February 1986, then more. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo awards and the John W. Campbell Award for Best New Writer. Info: ConFederation, Suite 1986, 3277 Roswell Road, Atlanta, GA 30305. *[Note change of mailing address]*

—Anthony Lewis

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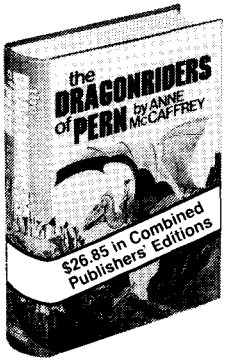

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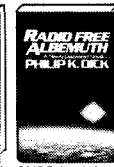

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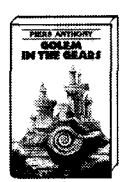

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